A.6 NR standalone tests with all NR cells in FR1

A.6.1 SA: RRC_IDLE state mobility

A.6.1.1 Cell re-selection to NR

A.6.1.1.1 Cell reselection to FR1 intra-frequency NR case

A.6.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.6.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.2-1, A.6.1.1.1.2-2 and A.6.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.1.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
T2 end condition	Active cell		1, 2, 3	Cell2	
	Neighbour cells		1, 2, 3	Cell1	
Final condition	Active cell		1, 2, 3	Cell1	
	Neighbour cells		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 µs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC.2	Configured in SIB2 of Cell 1
				SMTC.6	Configured in SIB2 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle length		s	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		s	1, 2, 3	40	T2 needs to be defined so that cell re-selection reaction time is taken into account.
T3		s	1, 2, 3	15	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD		
		2	SR.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 FDD		
		2	CR.1.1 TDD			CR.1.1 TDD		
		3	CR.2.1 TDD			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 FDD		
		2	CCR.1.1 TDD			CCR.1.1 TDD		
		3	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2, 3	SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2	-130			-130		
		3	-127			-127		
Pcompensation	dB	1, 2, 3	0			0		
$Qhyst_s$	dB	1, 2, 3	0			0		
$Qoffset_{s, n}$	dB	1, 2, 3	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-98					
		2	-98					
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	16	13	16	-infinity	16	13
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-82	-infinity	-82	-85
		2	-82	-85	-82	-infinity	-82	-85
		3	-79	-82	-79	-infinity	-79	-82
Io	dBm/9.36 MHz	1	-53.94	-52.21	-52.21	Same as parameters specified in Cell 1 columns-		
	dBm/9.36 MHz	2	-53.94	-52.21	-52.21			
	dBm/38.16 MHz	3	-47.85	-46.12	-46.12			
Treselection	s	1, 2, 3	0	0	0	0	0	0
SintrasearchP	dB	1, 2, 3	60			60		
Propagation Condition		1, 2, 3	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect, NR\_Intra} + T_{SI-NR}$, and to an already detected cell can be expressed as: $T_{evaluate, NR\_ intra} + T_{SI-NR}$,

Where:

T_{detect, NR_Intra} See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate, NR\_ intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s for the cell re-selection delay to an already detected cell in the test case, which we allow 8 s.

A.6.1.1.2 Cell reselection to FR1 inter-frequency NR case

A.6.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.6.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.2.2-1, A.6.1.1.2.2-2 and A.6.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.6.1.1.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1
	Neighbour cell		1, 2, 3	Cell 1	
T1 end condition	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1, 2, 3	Cell2	
T3 end condition	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
	Neighbour cell		1, 2, 3	Cell 1	
RF Channel Number			1, 2, 3	1, 2	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC.2	Configured in SIB4 of Cell 1
				SMTC.6	Configured in SIB4 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle length		s	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3		s	1, 2, 3	75	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD		
		2	SR.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 FDD		
		2	CR.1.1 TDD			CR.1.1 TDD		
		3	CR.2.1 TDD			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 FDD		
		2	CCR.1.1 TDD			CCR.1.1 TDD		
		3	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2, 3	SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2	-140			-140		
		3	-137			-137		
Pcompensation	dB	1, 2, 3	0			0		
Cell_selection_and_ reselection_quality_ measurement		1, 2, 3	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	14	14	14	-4	-infinity	12
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-98					
		2	-98					
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	14	14	14	-4	-infinity	12
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-84	-84	-84	-102	-infinity	-86
		2	-84	-84	-84	-102	-infinity	-86
		3	-81	-81	-81	-99	-infinity	-83
Io	dBm/9.36 MHz	1	-55.88	-55.88	-55.88	-68.60	-70.05	-57.78
	dBm/9.36 MHz	2	-55.88	-55.88	-55.88	-68.60	-70.05	-57.78
	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50	-63.96	-51.69
Treselection	s	1, 2, 3	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2, 3	50			50		
Thresh$_{x,\ highP}$	dB	1, 2, 3	48			48		
Thresh$_{serving,\ lowP}$	dB	1, 2, 3	44			44		
Thresh$_{x,\ lowP}$	dB	1, 2, 3	50			50		
Propagation Condition		1, 2, 3	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search}$ + $T_{evaluate, NR\_ inter}$ + T_{SI-NR}, and to a lower priority cell can be expressed as: $T_{evaluate, NR\_ inter}$ + T_{SI-NR},

Where:

$T_{higher\_priority\_search}$ See clause 4.2.2.7

$T_{evaluate, NR\_ inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.6.1.1.3 Cell reselection to FR1 intra-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

A.6.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE fulfilling low mobility criterion specified in clause 4.2.2.9.2

A.6.1.1.3.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.3.2-1, A.6.1.1.3.2-2 and A.6.1.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.3.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.1.1.3.2-2: General test parameters for FR1 intra frequency NR cell re-selection test case for UE fulfilling low mobility criterion

Parameter	Unit	Test configuration	Value	Comment

Initial condition	Active cell		1, 2, 3	Cell1	The UE camps on cell 1 in the initial phase
	Neighbour cells		1, 2, 3	Cell2	
T1 end condition	Active cell		1, 2, 3	Cell2	The UE reselects to cell 2 during T1 period
	Neighbour cells		1, 2, 3	Cell1	
Final condition	Active cell		1, 2, 3	Cell1	The UE reselects to cell 1 during T2 period
	Neighbour cells		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC pattern 2	Configured in SIB2 of Cell 1
				SMTC pattern 6	Configured in SIB2 of Cell 2
			2	SMTC pattern 1	
			3	SMTC pattern 1	
DRX cycle length		s	1, 2, 3	0.64	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	25	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3	25	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.1.3.2-3: Cell specific test parameters for FR1 intra frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2, 3	SSB		SSB	
Qrxlevmin	dBm/SCS	1, 2	-140		-140	
		3	-137		-137	
Pcompensation	dB	1, 2, 3	0		0	
$Qhyst_s$	dB	1, 2, 3	0		0	
$Qoffset_{s,n}$	dB	1, 2, 3	0		0	
$S_{SearchDeltaP}$	dB	1, 2, 3	3		3	
$T_{SearchDeltaP}$	s	1, 2, 3	5		5	
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP		SS-RSRP	
$\hat{E}_s/I_{ot}$	dB	1, 2, 3	-3.11	2.79	2.79	-3.11
N_{oc} Note2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note2	dBm/15 kHz	1, 2, 3	-98			
$\hat{E}_s/N_{oc}$	dB	1, 2, 3	13	16	16	13
SS-RSRP Note3	dBm/SCS	1	-85	-82	-82	-85
		2	-85	-82	-82	-85
		3	-82	-79	-79	-82
Io	dBm/9.36 MHz	1	-52.21	-52.21	specified in Cell 1	

	dBm/9.36 MHz	2	-52.21	-52.21	columns-	
	dBm/38.16 MHz	3	-46.12	-46.12		
Treselection	s	1, 2, 3	0	0	0	0
SintrasearchP	dB	1, 2, 3	60		60	
Propagation Condition		1, 2, 3	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.1.1.3.3 Test Requirements

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 17 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to an already detected cell can be expressed as: $T_{evaluate,NR\_Intra} + T_{SI-NR}$,

Where:

$T_{evaluate,NR\_Intra}$ See Table 4.2.2.9.2-1 in clause 4.2.2.9.2 for reselection to Cell 2 during T1 with UE fulfilling low mobility criterion. 15.36s.

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell for UE fulfilling low mobility criterion in the test case.

A.6.1.1.4 Cell reselection to FR1 intra-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

A.6.1.1.4.1 Test Purpose and Environment

This test is to verify the relaxed cell re-selection requirement for UEs configured with not-at-cell edge criterion specified in clause 4.2.2.9.3.

A.6.1.1.4.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.4.2-1, A.6.1.1.4.2-2 and A.6.1.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both Cell 1 and Cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas.

Table A.6.1.1.4.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.1.1.4.2-2: General test parameters for FR1 intra frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active Cell		1, 2, 3	Cell1	The UE camps on Cell 1 in the initial phase
	Neighbour Cells		1, 2, 3	Cell2	
T1 end condition	Active Cell		1, 2, 3	Cell2	The UE shall fulfil the not-at-cell edge criterion and reselect to cell 2 during T1 period during T1.
	Neighbour Cells		1, 2, 3	Cell1	
T2 end condition	Active Cell		1, 2, 3	Cell1	The UE shall perform reselection to Cell 1 during T2
	Neighbour Cells		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1	
Time offset between Cells			1	3 ms	Asynchronous Cells
			2	3 μs	Synchronous Cells
			3	3 μs	Synchronous Cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC pattern 2	Configured in SIB2 of Cell 1
				SMTC pattern 6	Configured in SIB2 of Cell 2
			2	SMTC pattern 1	
			3	SMTC pattern 1	
DRX cycle length		s	1, 2, 3	0.64	The value shall be used for all Cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	20	T1 needs to be defined so that Cell re-selection reaction time is taken into account.
T2		s	1, 2, 3	20	T2 needs to be defined so that Cell re-selection reaction time is taken into account.

Table A.6.1.1.4.2-3: Cell specific test parameters for FR1 intra frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2, 3	SSB		SSB	
Qrxlevmin	dBm/SCS	1, 2	-140		-140	
		3	-137		-137	
Pcompensation	dB	1, 2, 3	0		0	
$Qhyst_s$	dB	1, 2, 3	0		0	
$Qoffset_{s, n}$	dB	1, 2, 3	0		0	
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP		SS-RSRP	
$\hat{E}_s/I_{ot}$	dB	1	-3.11	2.79	2.79	-3.11
		2				
		3				
N_{oc} Note2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	13	16	16	13
		2				

		3				
SS-RSRP Note3	dBm/SCS	1	-85	-82	-82	-85
		2	-85	-82	-82	-85
		3	-82	-79	-79	-82
Io	dBm/9.36 MHz	1	-52.21	-52.21	-52.21	-52.21
	dBm/9.36 MHz	2	-52.21	-52.21	-52.21	-52.21
	dBm/38.16 MHz	3	-46.12	-46.12	-46.12	-46.12
Treselection	s	1, 2, 3	0	0	0	0
SintrasearchP	dB	1, 2, 3	60		60	
$S_{searchThresholdP}$	dB	1, 2, 3	50	Not sent	Not sent	50
Propagation Condition		1, 2, 3	AWGN			
Note 1: OCNG shall be used such that both Cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other Cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.1.1.4.3 Test Requirements

The cell re-selection delay to an already detected cell for UE configured with *cellEdgeEvaluation* criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell for UE configured with *cellEdgeEvaluation* criterion shall be less than 17s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to an already detected cell for UE configured with relaxed measurement criterion can be expressed as: $T_{evaluate,NR\_Intra} + T_{SI-NR}$,

Where:

$T_{evaluate,NR\_Intra}$ See Table 4.2.2.9.3-1 for UE fulfilling not-at-cell edge criterion in clause 4.2.2.9.3.

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a Cell; 1280ms is assumed in this test case.

This gives a total of 16.64s, allow 17s for the cell re-selection delay to an already detected cell for UE fulfilling not-at-cell edge criterion in the test case.

A.6.1.1.5 Cell reselection to FR1 inter-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

A.6.1.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.10.2, for UE fulfilling low mobility relaxed measurement criterion.

A.6.1.1.5.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.5.2-1, A.6.1.1.5.2-2 and A.6.1.1.5.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for UE with low mobility defined in clause 5.2.4.9.1 in [1]. So, Cell 2 and Cell 1 configure the UE as follows:

lowMobilityEvalutation [2] criterion is configured according to the parameters listed in Table A.6.1.1.5.2-3;

cellEdgeEvaluation [2] criterion is not configured;

combineRelaxedMeasCondition [2] is not configured;

Table A.6.1.1.5.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.1.5.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case for UE fulfilling low mobility criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 in the initial phase, it fulfills Low Mobility relaxation measurements criterion, and during T1 period the UE reselects to cell 1
	Neighbour cells		1, 2, 3	Cell1	
T1 end condition	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1, 2, 3	Cell2	

T2 end condition	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2 with higher priority during T2
	Neighbour cells		1, 2, 3	Cell1	
RF Channel Number			1, 2, 3	1, 2	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB Configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC pattern 2	Configured in SIB4 of Cell 1
				SMTC pattern 6	Configured in SIB4 of Cell 2
			2	SMTC pattern 1	
			3	SMTC pattern 1	
DRX cycle length		s	1, 2, 3	0.64	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	25 s	T1 is defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3	25 s	T2 is defined so that cell re-selection reaction time is taken into account.

Table A.6.1.1.5.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		SR.1.1 FDD	
		2	SR.1.1 TDD		SR.1.1 TDD	
		3	SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2, 3	SSB		SSB	
Qrxlevmin	dBm/SCS	1, 2	-140		-140	
		3	-137		-137	
Pcompensation	dB	1, 2, 3	0		0	
$Qhyst_s$	dB	1, 2, 3	0		0	
$Qoffset_{s, n}$	dB	1, 2, 3	0		0	
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP		SS-RSRP	
$\hat{E}_s/I_{ot}$	dB	1	14	14	-4	12
		2				
		3				
N_{oc} Note2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	14	14	-4	12
		2				
		3				
SS-RSRP Note3	dBm/SCS	1	-84	-84	-102	-86
		2	-84	-84	-102	-86
		3	-81	-81	-99	-83
Io	dBm/9.36 MHz	1	-55.88	-55.88	-68.60	-57.78
	dBm/9.36 MHz	2	-55.88	-55.88	-68.60	-57.78
	dBm/38.16 MHz	3	-49.79	-49.79	-62.50	-51.69
Treselection	s	1, 2, 3	0	0	0	0
SnonintrasearchP	dB	1, 2, 3	Not sent		Not sent	
$Thresh_{x, highP}$	dB	1, 2, 3	48		48	

$Thresh_{serving, lowP}$	dB	1, 2, 3	44	44
$Thresh_{x, lowP}$	dB	1, 2, 3	50	50
$S_{SearchDeltaP}$	dB	1, 2, 3	3	3
$T_{SearchDeltaP}$	s	1, 2, 3	5	5
Propagation Condition		1, 2, 3	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.6.1.1.5.3 Test Requirements

The cell reselection delay to an already detected lower priority cell for UE fulfilling low mobility relaxed measurements is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell for UE fulfilling low mobility relaxed measurements shall be less than 17 s.

The cell reselection delay to an already detected higher priority cell for UE fulfilling low mobility relaxed measurements is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to an already detected higher priority cell for UE fulfilling low mobility relaxed measurements shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a known lower priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$,

Where:

$T_{evaluate, NR\_ inter}$ See Table 4.2.2.10.2-1 in clause 4.2.2.10.2

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 16.64 s, allow 17s for the cell re-selection delay to an already detected lower priority cell and 16.64s for the cell re-selection delay to an already detected higher priority cell, which we allow 17s for UE fulfilling low mobility relaxed measurements in the test case.

A.6.1.1.6 Cell reselection to FR1 inter-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

A.6.1.1.6.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.10.3, for UE fulfilling not-at-cell edge relaxed measurement criterion.

A.6.1.1.6.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.6.2-1, A.6.1.1.6.2-2 and A.6.1.1.6.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for UE not-at-cell edge as defined in clause 5.2.4.9.2 in [1]. So, Cell 2 and Cell 1configures the UE as follows:

cellEdgeEvaluation [2] criterion is configured according to the parameters listed in Table A.6.1.1.5.2-3;

lowMobilityEvalutation [2] criterion is not configured;

combineRelaxedMeasCondition [2] is not configured;

Table A.6.1.1.6.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.1.6.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 in the initial phase, it fulfills Not-at-cell edge relaxation measurements criterion, and during T1 period the UE reselects to cell 1
	Neighbour cells		1, 2, 3	Cell1	
T1 end condition	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1, 2, 3	Cell2	

T2 end condition	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2 with higher priority during T2
	Neighbour cells		1, 2, 3	Cell1	

Parameter	Unit	Test	Cell 1	Cell 2

RF Channel Number		1, 2, 3	1, 2	
Time offset between cells		1	3 ms	Asynchronous cells
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
Access Barring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB Configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC pattern 2	Configured in SIB4 of Cell 1
			SMTC pattern 6	Configured in SIB4 of Cell 2
		2	SMTC pattern 1	
		3	SMTC pattern 1	
DRX cycle length	s	1, 2, 3	0.64	The value shall be used for all cells in the test.
PRACH configuration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell		1, 2, 3	Not configured	
T1	s	1, 2, 3	20 s	T1 is defined so that cell re-selection reaction time is taken into account.
T2	s	1, 2, 3	20 s	T2 is defined so that cell re-selection reaction time is taken into account.

Table A.6.1.1.6.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

		configuration	T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		SR.1.1 FDD	
		2	SR.1.1 TDD		SR.1.1 TDD	
		3	SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2, 3	SSB		SSB	
Qrxlevmin	dBm/SCS	1, 2	-140		-140	
		3	-137		-137	
Pcompensation	dB	1, 2, 3	0		0	
$Qhyst_s$	dB	1, 2, 3	0		0	
$Qoffset_{s, n}$	dB	1, 2, 3	0		0	
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP		SS-RSRP	
$\hat{E}_s/I_{ot}$	dB	1	14	14	-4	12
		2				
		3				
N_{oc} Note2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	14	14	-4	12
		2				
		3				
SS-RSRP Note3	dBm/SCS	1	-84	-84	-102	-86
		2	-84	-84	-102	-86
		3	-81	-81	-99	-83
Io	dBm/9.36 MHz	1	-55.88	-55.88	-68.60	-57.78
	dBm/9.36 MHz	2	-55.88	-55.88	-68.60	-57.78
	dBm/38.16 MHz	3	-49.79	-49.79	-62.50	-51.69
Treselection	s	1, 2, 3	0	0	0	0
SnonintrasearchP	dB	1, 2, 3	Not sent		Not sent	
$Thresh_{x, highP}$	dB	1, 2, 3	48		48	
$Thresh_{serving, lowP}$	dB	1, 2, 3	44		44	

$Thresh_{x, lowP}$	dB	1, 2, 3	50	50
$S_{SearchThresholdP}$	dB	1, 2, 3	50	50
$S_{SearchThresholdQ}$	s	1, 2, 3	Not Configured	
Propagation Condition		1, 2, 3	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.6.1.1.6.3 Test Requirements

The cell reselection delay to an already detected lower priority cell for UE fulfilling not-at-cell edge relaxed measurements is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected lower priority cell for UE fulfilling not-at-cell edge relaxed measurements shall be less than 17 s.

The cell reselection delay to an already detected higher priority cell for UE fulfilling not-at-cell-edge relaxed measurements is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to an already detected higher priority cell for UE fulfilling not-at-cell-edge relaxed measurements shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$,

Where:

$T_{evaluate, NR\_ inter}$ See Table 4.2.2.10.3-1 in clause 4.2.2.10

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 16.64 s , allow 17s for the cell re-selection delay to an already detected lower priority cell and 16.64s for the cell re-selection delay to an already higher priority cell, which we allow 17s for UE fulfilling not-at-cell edge relaxed measurements in the test case.

A.6.1.1.7 Cell reselection to FR1 intra-frequency NR case for UE configured with *highSpeedMeasFlag-r16*

A.6.1.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with *highSpeedMeasFlag-r16* specified in clause 4.2.2.3.

A.6.1.1.7.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.x-1, A.6.1.1.1.x-2 and A.6.1.1.1.x-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2. *highSpeedMeasFlag-r16* is broadcasted to UE.

Table A.6.1.1.7.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.1.1.7.2-2: General test parameters for intra frequency NR cell re-selection test case for UE c*onfigured with highSpeedMeasFlag-r16*

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
	Neighbour cells		1, 2, 3	Cell2	
T2 end condition	Active cell		1, 2, 3	Cell2	
	Neighbour cells		1, 2, 3	Cell1	

Final condition	Active cell		1, 2, 3	Cell1	
	Neighbour cells		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	Configured in SIB2 of Cell 1
				SMTC pattern 6	Configured in SIB2 of Cell 2
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC pattern 2	
			2	SMTC pattern 1	
			3	SMTC pattern 1	
DRX cycle length		s	1, 2, 3	0.32	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		s	1, 2, 3	40	T2 needs to be defined so that cell re-selection reaction time is taken into account.
T3		s	1, 2, 3	15	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.1.7.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case for UE *configured with highSpeedMeasFlag-r16*

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3

TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD		
		2	SR.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 FDD		
		2	CR.1.1 TDD			CR.1.1 TDD		
		3	CR.2.1 TDD			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 FDD		
		2	CCR.1.1 TDD			CCR.1.1 TDD		
		3	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2, 3	SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2	-140			-140		
		3	-137			-137		
Pcompensation	dB	1, 2, 3	0			0		
$Qhyst_s$	dB	1, 2, 3	0			0		
$Qoffset_{s, n}$	dB	1, 2, 3	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-98					
		2	-98					
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	16	13	16	-infinity	16	13
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-82	-infinity	-82	-85
		2	-82	-85	-82	-infinity	-82	-85
		3	-79	-82	-79	-infinity	-79	-82
Io	dBm/9.36 MHz	1	-53.94	-52.21	-52.21	Same as parameters specified in Cell 1 columns-		
	dBm/9.36 MHz	2	-53.94	-52.21	-52.21			
	dBm/38.16 MHz	3	-47.85	-46.12	-46.12			
Treselection	s	1, 2, 3	0	0	0	0	0	0
SintrasearchP	dB	1, 2, 3	60			60		
Propagation Condition		1, 2	AWGN			AWGN 1944Hz Note4		
Propagation Condition		3	AWGN			AWGN 3334Hz Note5		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.
Note 5:	The AWGN 3334 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 3334 Hz.

A.6.1.1.7.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 4 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 3 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect, NR\_Intra} + T_{SI-NR}$, and to an already detected cell can be expressed as: $T_{evaluate, NR\_ intra} + T_{SI-NR}$,

Where:

T_{detect, NR_Intra} See Table 4.2.2.3-2 in clause 4.2.2.3

$T_{evaluate, NR\_ intra}$ See Table 4.2.2.3-2 in clause 4.2.2.3

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 3.84s, allow 4s for the cell re-selection delay to a newly detectable cell and 2.24 s for the cell re-selection delay to an already detected cell in the test case, which we allow 3 s.

A.6.1.2 Inter-RAT E-UTRAN cell re-selection

A.6.1.2.1 Cell reselection to higher priority E-UTRAN

A.6.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

A.6.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.1.2-1, A.6.1.2.1.2-2, A.6.1.2.1.2-3 and A.6.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and

T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.6.1.2.1.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2.
T2 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T2.
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
T3 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1 during T3 for iteration of the tests.
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1, 2, 3	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			4, 5, 6	4	
E-UTRAN PRACH configuration index			1, 2, 3	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			4, 5, 6	4	
T1		s	1, 2, 3, 4, 5, 6	>7	During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2.
T2		s	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-selection reaction time is taken into account.
T3		s	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.2.1.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 1 T3
TDD configuration		1, 4	N/A		
		2, 5	TDDConf.1.1		
		3, 6	TDDConf.2.1		
PDSCH parameters		1, 4	SR.1.1 FDD		
		2, 5	SR.1.1 TDD		
		3, 6	SR.2.1 TDD		
RMSI CORESET parameters		1, 4	CR.1.1 FDD		
		2, 5	CR.1.1 TDD		
		3, 6	CR.2.1 TDD		
Dedicated CORESET parameters		1, 4	CCR.1.1 FDD		
		2, 5	CCR.1.1 TDD		
		3, 6	CCR.2.1 TDD		
SSB parameters		1, 4	SSB.1 FR1		
		2, 5	SSB.1 FR1		
		3, 6	SSB.2 FR1		
NR SMTC parameters		1, 4	SMTC.2		
		2, 5	SMTC.1		
		3, 6	SMTC.1		
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1		
RLM-RS		1, 2, 3, 4, 5, 6	SSB		
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140		
		3, 6	-137		
N_{oc}	dBm/SCS	1, 4	-98		
		2, 5	-98		
		3, 6	-95		
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98		
SS-RSRP	dBm/SCS	1, 4	-84	-84	-84
		2, 5	-84	-84	-84
		3, 6	-81	-81	-81
$\hat{E}_s/I_{ot}$	dB	1, 4	14	14	14
		2, 5			
		3, 6			
$\hat{E}_s/N_{oc}$	dB	1, 4	14	14	14
		2, 5			
		3, 6			
Io	dBm/9.36 MHz	1, 4	-55.88	-55.88	-55.88
	dBm/9.36 MHz	2, 5	-55.88	-55.88	-55.88
	dBm/38.16 MHz	3, 6	-49.79	-49.79	-49.79
Treselection	S	1, 2, 3, 4, 5, 6	0		
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	50		
$Thresh_{x, highP}$ (Note 2)	dB	1, 2, 3, 4, 5, 6	48		
$Thresh_{serving, lowP}$	dB	1, 2, 3, 4, 5, 6	44		
$Thresh_{x, lowP}$	dB	1, 2, 3, 4, 5, 6	50		
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of $Thresh_{x, high}$ which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2		
		T1	T2	T3
E-UTRA RF Channel number		1		
$BW_{channel}$	MHz	10		
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6		
PBCH_RA	dB	0		
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB			
PHICH_RB	dB			
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA[Note 1]	dB			
OCNG_RB[Note 1]	dB			
Qrxlevmin	dBm	-140		
N_{oc}	dBm/15 kHz	-98		
RSRP	dBm/15 KHz	-infinity	-86	-102
$\hat{E}_s/I_{ot}$	dB	-infinity	12	-4
$\hat{E}_s/N_{oc}$	dB	-infinity	12	-4
$Treselection_{EUTRAN}$	S	0		
SnonintrasearchP	dB	Not sent		
$Thresh_{x, highP}$	dB	48		
$Thresh_{serving, lowP}$	dB	44		
$Thresh_{x, lowP (Note 2)}$	dB	50		
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{\mathbf{x, Low}}$ which is included in E-UTRA system information, and is a threshold for the NR target cell				

A.6.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search} + T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

$T_{higher\_priority\_search}$ See clause 4.2.2.7

$T_{evaluate,\ E\text{-}UTRAN}$ See Table 4.2.2.5-1 in clause 4.2.2.5

$T_{SI\text{-}E\text{-}UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.6.1.2.2 Cell reselection to lower priority E-UTRAN

A.6.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.2.2-1, A.6.1.2.2.2-2, A.6.1.2.2.2-3 and A.6.1.2.2.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.6.1.2.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase.
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	
T1 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T1.
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
T2 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1 during T2 for iteration of the tests.
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1, 2, 3	534	As specified in table 5.7.1-2 in TS 36.211 [23]
			4, 5, 6		
T1		s	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.2.2.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1, 4	N/A	
		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
PDSCH RMC configuration		1, 4	SR.1.1 FDD	
		2, 5	SR.1.1 TDD	
		3, 6	SR.2.1 TDD	
RMSI CORESET RMC configuration		1, 4	CR.1.1 FDD	
		2, 5	CR.1.1 TDD	
		3, 6	CR.2.1 TDD	
Dedicated CORESET RMC configuration		1, 4	CCR.1.1 FDD	
		2, 5	CCR.1.1 TDD	
		3, 6	CCR.2.1 TDD	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC.2	
		2, 5	SMTC.1	
		3, 6	SMTC.1	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1	
RLM-RS		1, 2, 3, 4, 5, 6	SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140	
		3, 6	-137	
N_{oc}	dBm/SCS	1, 4	-98	
		2, 5	-98	
		3, 6	-95	
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	
SS-RSRP	dBm/SCS	1, 4	-102	-86
		2, 5	-102	-86
		3, 6	-99	-83
$\hat{E}_s/I_{ot}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
$\hat{E}_s/N_{oc}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
Io	dBm/9.36 MHz	1, 4	-68.60	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-51.69
Treselection	S	1, 2, 3, 4, 5, 6	0	
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	50	
$Thresh_{x, highP}$	dB	1, 2, 3, 4, 5, 6	48	
$Thresh_{serving, lowP}$	dB	1, 2, 3, 4, 5, 6	44	
$Thresh_{x, lowP}$ (Note 2)	dB	1, 2, 3, 4, 5, 6	50	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x, high}$ which is included in NR system information, and is a threshold for the E-UTRA target cell				

Table A.6.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2	
		T1	T2
E-UTRA RF Channel number		1	
$BW_{channel}$	MHz	10	
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6	
PBCH_RA	dB	0	
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA Note 1	dB		
OCNG_RB Note 1	dB		
Qrxlevmin	dBm	-140	
N_{oc}	dBm/15 kHz	-98	
RSRP	dBm/15 KHz	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14
$\hat{E}_s/N_{oc}$	dB	14	14
$Treselection_{EUTRAN}$	S	0	
SnonintrasearchP	dB	Not sent	
$Thresh_{x, highP}$ (Note 2)	dB	48	
$Thresh_{serving, lowP}$	dB	44	
$Thresh_{x, lowP}$	dB	50	
Propagation Condition		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x, high}$ which is included in E-UTRA system information, and is a threshold for the NR target cell			

A.6.1.2.2.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

$T_{evaluate, E-UTRAN}$ See Table 4.2.2.5-1 in clause 4.2.2.5

$T_{SI-E-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.6.1.2.3 Cell reselection to lower priority E-UTRAN for UE fulfilling low mobility relaxed measurement criterion

A.6.1.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection when UE fulfills the low mobility criterion specified in clause 4.2.2.11.2 and the E-UTRAN cell is of lower priority.

A.6.1.2.3.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.3.2-1, A.6.1.2.3.2-2, A.6.1.2.3.2-3 and A.6.1.2.3.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for UE with low mobility defined in clause 5.2.4.9.1 in [1]. So, Cell 1 configures the UE as follows:

- *lowMobilityEvalutation* [2] criterion is configured according to the parameters listed in Table A.6.1.2.3.2-3;
- *cellEdgeEvaluation* [2] criterion is not configured;
- *combineRelaxedMeasCondition* [2] is not configured

Table A.6.1.2.3.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.2.3.2-2: General test parameters for NR to E-UTRAN cell re-selection test case for UE fulfilling low mobility criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase, it fulfills Low Mobility relaxation measurements criterion, and during T1 period the UE reselects to cell 2
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
T1 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T1
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	
T2 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1 with higher priority during T2 for iteration of the tests.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	1, 2, 3, 4, 5, 6	0.64	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1, 2, 3	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			4, 5, 6	4	
T1		s	1, 2, 3, 4, 5, 6	24	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3, 4, 5, 6	24	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.2.3.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2
TDD configuration		1, 4	N/A	
		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
PDSCH RMC configuration		1, 4	SR.1.1 FDD	
		2, 5	SR.1.1 TDD	
		3, 6	SR.2.1 TDD	
RMSI CORESET RMC configuration		1, 4	CR.1.1 FDD	
		2, 5	CR.1.1 TDD	
		3, 6	CR.2.1 TDD	
Dedicated CORESET RMC configuration		1, 4	CCR.1.1 FDD	
		2, 5	CCR.1.1 TDD	
		3, 6	CCR.2.1 TDD	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC pattern 2	
		2, 5	SMTC pattern 1	
		3, 6	SMTC pattern 1	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1	
RLM-RS		1, 2, 3, 4, 5, 6	SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140	
		3, 6	-137	
N_{oc}	dBm/SCS	1, 4	-98	
		2, 5	-98	
		3, 6	-95	
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	
SS-RSRP	dBm/SCS	1, 4	-102	-86
		2, 5	-102	-86
		3, 6	-99	-83
$\hat{E}_s/I_{ot}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
$\hat{E}_s/N_{oc}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
Io	dBm/9.36 MHz	1, 4	-68.60	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-51.69
TreselectionP	S	1, 2, 3, 4, 5, 6	0	
Snonintrasearch	dB	1, 2, 3, 4, 5, 6	50	
$Thresh_{x, highP}$	dB	1, 2, 3, 4, 5, 6	48	
$Thresh_{serving, lowP}$	dB	1, 2, 3, 4, 5, 6	44	
$Thresh_{x, lowP}$ (Note 2)	dB	1, 2, 3, 4, 5, 6	50	
$S_{SearchDeltaP}$	dB	1, 2, 3, 4, 5, 6	3	
$T_{SearchDeltaP}$	s	1, 2, 3, 4, 5, 6	5	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x, low}$ which is included in NR system information, and is a threshold for the E-UTRA target cell				

Table A.6.1.2.3.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2	
		T1	T2
E-UTRA RF Channel number		1	
$BW_{channel}$	MHz	10	
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6	
PBCH_RA	dB	0	
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA[Note 1]	dB		
OCNG_RB[Note 1]	dB		
Qrxlevmin	dBm	-140	
N_{oc}	dBm/15 kHz	-98	
RSRP	dBm/15 KHz	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14
$\hat{E}_s/N_{oc}$	dB	14	14
$Treselection_{EUTRAN}$	S	0	
Snonintrasearch	dB	Not sent	
$Thresh_{x,\ high\ (Note\ 2)}$	dB	48	
$Thresh_{serving,\ low}$	dB	44	
$Thresh_{x,\ low}$	dB	50	
Propagation Condition		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x,\ high}$ which is included in E-UTRA system information, and is a threshold for the NR target cell			

A.6.1.2.3.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell with UE fulfilling low mobility criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCConnectionRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN} + T_{SI\text{-}E\text{-}UTRA}$,

Where:

$T_{evaluate, E-UTRAN}$ See Table 4.2.2.11.2-1 in clause 4.2.2.11.2

$T_{SI-E-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 15.36 ($T_{evaluate, E-UTRAN}$) + 1.28 ($T_{SI-E-UTRA}$) = 16.64 s, allow 17 s for the cell re-selection delay to a lower priority E-UTRAN cell for UE fulfilling low mobility criterion.

A.6.1.2.4 Cell reselection to lower priority E-UTRAN for UE fulfilling not-at-cell edge relaxed measurement criterion

A.6.1.2.4.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements when UE fulfills not-at-cell edge criterion specified in clause 4.2.2.11.3 when the E-UTRAN cell is of lower priority.

A.6.1.2.4.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.4.2-1, A.6.1.2.4.2-2, A.6.1.2.4.2-3 and A.6.1.2.4.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

As specified in the Test Purpose, the UE is configured with the relaxed measurement criterion for UE with not-at-cell edge defined in clause 5.2.4.9.2 in [1]. So, Cell 1 configures the UE as follows:

- *lowMobilityEvalutation* [2] criterion is not configured;
- *cellEdgeEvaluation* [2] criterion is configured according to the parameters listed in Table A.6.1.2.4.2-3;
- *combineRelaxedMeasCondition* [2] is not configured

Table A.6.1.2.4.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.2.4.2-2: General test parameters for NR to E-UTRAN cell re-selection test case for UE fulfilling not-at-cell edge criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase and fulfill the not at the cell edge criteria.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
T1 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T1.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	

T2 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1 during T2 for iteration of the tests.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	1, 2, 3, 4, 5, 6	0.64	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1, 2, 3	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			4, 5, 6	4	
T1		s	1, 2, 3, 4, 5, 6	24	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3, 4, 5, 6	24	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.2.4.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1, 4	N/A	
		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
PDSCH RMC configuration		1, 4	SR.1.1 FDD	
		2, 5	SR.1.1 TDD	
		3, 6	SR.2.1 TDD	
RMSI CORESET RMC configuration		1, 4	CR.1.1 FDD	
		2, 5	CR.1.1 TDD	
		3, 6	CR.2.1 TDD	
Dedicated CORESET RMC configuration		1, 4	CCR.1.1 FDD	
		2, 5	CCR.1.1 TDD	
		3, 6	CCR.2.1 TDD	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC pattern 2	
		2, 5	SMTC pattern 1	
		3, 6	SMTC pattern 1	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1	
RLM-RS		1, 2, 3, 4, 5, 6	SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140	
		3, 6	-137	
N_{oc}	dBm/SCS	1, 4	-98	
		2, 5	-98	
		3, 6	-95	
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	
SS-RSRP	dBm/SCS	1, 4	-102	-86
		2, 5	-102	-86
		3, 6	-99	-83
$\hat{E}_s/I_{ot}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
$\hat{E}_s/N_{oc}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
$S_{SearchThresholdP}$	dB	1, 2, 3, 4, 5, 6	32	32
Io	dBm/9.36 MHz	1, 4	-68.60	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-51.69
Treselection	S	1, 2, 3, 4, 5, 6	0	
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	60	
$Thresh_{x, highP}$	dB	1, 2, 3, 4, 5, 6	48	
$Thresh_{serving, lowP}$	dB	1, 2, 3, 4, 5, 6	44	
$Thresh_{x, lowP}$ (Note 2)	dB	1, 2, 3, 4, 5, 6	50	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: This refers to the value of $Thresh_{x, low}$ which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.4.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2	
		T1	T2
E-UTRA RF Channel number		1	
$BW_{channel}$	MHz	10	
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6	
PBCH_RA	dB	0	
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA[Note 1]	dB		
OCNG_RB[Note 1]	dB		
Qrxlevmin	dBm	-140	
N_{oc}	dBm/15 kHz	-98	
RSRP	dBm/15 KHz	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14
$\hat{E}_s/N_{oc}$	dB	14	14
$Treselection_{EUTRAN}$	S	0	
Snonintrasearch	dB	Not sent	
$Thresh_{x, high (Note 2)}$	dB	48	
$Thresh_{serving, low}$	dB	44	
$Thresh_{x, low}$	dB	50	
Propagation Condition		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x, high}$ which is included in E-UTRA system information, and is a threshold for the NR target cell			

A.6.1.2.4.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCConnectionRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 17s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

$T_{evaluate, E-UTRAN}$ See Table 4.2.2.11.3-1 in clause 4.2.2.11.3

$T_{SI\text{-}E\text{-}UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 16.64 s, allow 17 s for the cell re-selection delay to a lower priority E-UTRAN cell for UE fulfilling not-at-cell edge criterion.

A.6.1.2.5 Cell reselection to lower priority E-UTRAN cell for UE configured with highSpeedMeasFlag-r16

A.6.1.2.5.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements for UE configured with *highSpeedMeasFlag-r16* specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.5.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.5.2-1, A.6.1.2.5.2-2, A.6.1.2.5.2-3 and A.6.1.2.5.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1. The E-UTRAN cell 2 is indicated by NR cell 1 as an HST cell.

Table A.6.1.2.5.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.1.2.5.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase.
T1 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T1.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	
T2 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1 during T2 for iteration of the tests.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	1, 2, 3, 4, 5, 6	0.32	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	77	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1, 2, 3, 4, 5, 6	53	As specified in table 5.7.1-2 in TS 36.211 [23]
T1		s	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.6.1.2.5.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1, 4	N/A	
		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
PDSCH RMC configuration		1, 4	SR.1.1 FDD	
		2, 5	SR.1.1 TDD	
		3, 6	SR.2.1 TDD	
RMSI CORESET RMC configuration		1, 4	CR.1.1 FDD	
		2, 5	CR.1.1 TDD	
		3, 6	CR.2.1 TDD	
Dedicated CORESET RMC configuration		1, 4	CCR.1.1 FDD	
		2, 5	CCR.1.1 TDD	
		3, 6	CCR.2.1 TDD	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC pattern 2	
		2, 5	SMTC pattern 1	
		3, 6	SMTC pattern 1	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1	
RLM-RS		1, 2, 3, 4, 5, 6	SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140	
		3, 6	-137	
N_{oc}	dBm/SCS	1, 4	-98	
		2, 5	-98	
		3, 6	-95	
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	
SS-RSRP	dBm/SCS	1, 4	-102	-86
		2, 5	-102	-86
		3, 6	-99	-83
$\hat{E}_s/I_{ot}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
$\hat{E}_s/N_{oc}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
Io	dBm/9.36 MHz	1, 4	-68.60	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-51.69
Treselection	S	1, 2, 3, 4, 5, 6	0	
$S_{nonintrasearchP}$	dB	1, 2, 3, 4, 5, 6	50	
$Thresh_{x,\ highP\ (Note\ 2)}$	dB	1, 2, 3, 4, 5, 6	48	
$Thresh_{serving,\ lowP}$	dB	1, 2, 3, 4, 5, 6	44	
$Thresh_{x,\ lowP}$	dB	1, 2, 3, 4, 5, 6	50	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN 1944Hz[Note3]	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	This refers to the value of $\text{Thresh}_{\mathbf{x,\ highP}}$ which is included in NR system information, and is a threshold for the E-UTRA target cell.
Note 3:	The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.

Table A.6.1.2.5.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2	
		T1	T2
E-UTRA RF Channel number		1	
$BW_{channel}$	MHz	10	
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6	
PBCH_RA	dB	0	
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA Note 1	dB		
OCNG_RB Note 1	dB		
Qrxlevmin	dBm	-140	
N_{oc}	dBm/15 kHz	-98	
RSRP	dBm/15 KHz	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14
$\hat{E}_s/N_{oc}$	dB	14	14
$\text{Treselection}_{\text{EUTRAN}}$	S	0	
$S_{\text{nonintrasearchP}}$	dB	Not sent	
$\text{Thresh}_{\text{x, highP}}$ (Note 2)	dB	48	
$\text{Thresh}_{\text{serving, lowP}}$	dB	44	
$\text{Thresh}_{\text{x, lowP}}$	dB	50	
Propagation Condition		AWGN 1944Hz	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $\text{Thresh}_{\mathbf{x,\ highP}}$ which is included in E-UTRA system information, and is a threshold for the NR target cell			

A.6.1.2.5.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 3 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN\_HST} + T_{SI\text{-}E\text{-}UTRA}$,

Where:

$T_{evaluate,\ E\text{-}UTRAN\_HST}$ See Table 4.2.2.5-2 in clause 4.2.2.5

$T_{SI\text{-}E\text{-}UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 2.24 s, allow 3 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.6.1.1.7 Void

A.6.2 SA: RRC_INACTIVE state mobility

A.6.3 RRC_CONNECTED state mobility

A.6.3.1 Handover

A.6.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell

A.6.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.1.2-2, and A.6.3.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.6.3.1.1.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.1.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤5	
T3		s	1	

Table A.6.3.1.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		Unit	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
NR RF Channel Number			1			1		
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
DRx Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD					
	Config 2		SR.1.1 TDD					
	Config 3		SR2.1 TDD					
CORESET Reference Channel	Config 1		CR.1.1 FDD					
	Config 2		CR.1.1 TDD					
	Config 3		CR2.1 TDD					
TRS configuration	Config 1		TRS.1.1 FDD					
	Config 2		TRS.1.1 TDD					
	Config 3		TRS.1.2 TDD					
OCNG Patterns			OP.1					
SMTC Configuration			SMTC.1					
SSB Configuration	Config 1,2		SSB.1 FR1					
	Config 3		SSB.2 FR1					
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz					
	Config 3		30 kHz					
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz					
	Config 3		30 kHz					
PRACH configuration			FR1 PRACH configuration 1					
BWP configuration	Initial DL BWP		DLBWP.0.1					
	Dedicated DL BWP		DLBWP.1.1					
	Initial UL BWP		ULBWP.0.1					
	Dedicated UL BWP		ULBWP.1.1					
EPRE ratio of PSS to SSS		dB	0					
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
N_{oc} Note2		dBm/15kHz	-98					
N_{oc} Note2	Config 1,2	dBm/SCS	-98					
	Config 3		-95					

$\hat{E}_s/I_{ot}$		dB	8	-3.3	-3.3	-Infinity	2.36	2.36
$\hat{E}_s/N_{oc}$		dB	8	8	8	-Infinity	11	11
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	-Infinity	-87	-87
	Config 3	dBm/SCS	-87	-87	-87	-Infinity	-84	-84
Io[Note3]	Config 1,2	dBm/9.36MHz	-61.41	-57.06	-57.06	-61.41	-57.06	-57.06
	Config 3	dBm/38.16MHz	-55.31	-50.96	-50.96	-55.31	-50.96	-50.96
Propagation condition		-	AWGN			AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.								

A.6.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 62 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

A.6.3.1.2 Intra-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.2.2-2, and A.6.3.1.2.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.2.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.2.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤5	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		1	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf. 2.1			
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			
	Config 2		SR.1.1 TDD			
	Config 3		SR2.1 TDD			
CORESET Reference Channel	Config 1		CR.1.1 FDD			
	Config 2		CR.1.1 TDD			
	Config 3		CR2.1 TDD			
TRS configuration	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
OCNG Patterns			OP.1			
SMTC Configuration			SMTC.1			
SSB Configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PRACH configuration			FR1 PRACH configuration 1			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			
N_{oc} Note2	Config 1,2	dBm/SCS	-98			

	Config 3		-95			
$\hat{E}_s/I_{ot}$		dB	8	-0.64	-Infinity	-0.64
$\hat{E}_s/N_{oc}$		dB	8	8	-Infinity	8
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-Infinity	-90
	Config 3	dBm/SCS	-87	-87	-Infinity	-87
Io Note3	Config 1,2	dBm/ 9.36MHz	-61.41	-58.71	-61.41	-58.71
	Config 3	dBm/ 38.16MHz	-55.31	-52.60	-55.31	-52.60
Propagation condition		-	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T2.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 82 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

A.6.3.1.3 Inter-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 inter frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.3.2-2, and A.6.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.3.2-1: Inter-frequency handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.3.2-2: General test parameters Inter-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
T1		s	5	
T2		s	≤5	

Table A.6.3.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		2	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
TRS configuration	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			
	Config 2		SR.1.1 TDD			
	Config 3		SR2.1 TDD			
CORESET Reference Channel	Config 1		CR.1.1 FDD			
	Config 2		CR.1.1 TDD			
	Config 3		CR2.1 TDD			
OCNG Patterns			OP.1			
SMTC Configuration			SMTC.1			
SSB Configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PRACH configuration			FR1 PRACH configuration 1			
BWP	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98		-98	
N_{oc} Note2	Config 1,2	dBm/SCS	-98		-98	

	Config 3		-95		-95	
$\hat{E}_s/I_{ot}$		dB	4	4	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	4	4	-Infinity	5
SSB_RP	Config 1,2	dBm/SCS	-94	-94	-Infinity	-93
	Config 3	dBm/SCS	-91	-91	-Infinity	-90
Io[Note3]	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59	-70.05	-63.85
	Config 3	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75
Propagation condition		-	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 132 ms from the beginning of time period T2.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 122 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 132 ms.

A.6.3.1.4 SA NR - E-UTRAN handover

A.6.3.1.4.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.4-1. General test parameters are provided in Table A.6.3.1.4-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.4-3 and A.6.3.1.4-4 respectively.

Table A.6.3.1.4-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.4-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement quantity			SS-RSRP	
E-UTRAN measurement quantity			RSRP	
b2-Threshold1		dBm	As specified in Table A.6.3.1.4-3	Absolute NR SS-RSRP threshold for event B2
b2-Threshold2EUTRAN		dBm	-98	Absolute E-UTRAN RSRP threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		s	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 9.1.2-1 started before T2 starts
T1		s	5	
T2		s	≤5	
T3		s	1	

Table A.6.3.1.4-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter		Unit	Configuration	Cell 1		
				T1	T2	T3
RF channel number			1, 2, 3, 4, 5, 6	1		
Duplex mode			1, 4	FDD		
			2, 3, 5, 6	TDD		
TDD Configuration			2, 5	TDDConf.1.1		
			3, 6	TDDConf.2.1		
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)		
			2, 5	10: $N_{RB,c}$ = 52 (TDD)		
			3, 6	40: $N_{RB,c}$ = 106 (TDD)		
PDSCH reference measurement channel			1, 4	SR.1.1 FDD		
			2, 5	SR.1.1 TDD		
			3, 6	SR.2.1 TDD		
CORSET reference channel			1, 4	CR.1.1 FDD		
			2, 5	CR.1.1 TDD		
			3, 6	CR.2.1 TDD		
TRS configuration			1, 4	TRS.1.1 FDD		
			2, 5	TRS.1.1 TDD		
			3, 6	TRS.1.2 TDD		
OCNG pattern[Note1]			1, 2, 3, 4, 5, 6	OP.1		
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1		
	Dedicated DL BWP			DLBWP.1.1		
	Initial UL BWP			ULBWP.0.1		
	Dedicated UL BWP			ULBWP.1.1		
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration			1, 2, 4, 5	SSB.1 FR1		
			3, 6	SSB.2 FR1		
b2-Threshold1		dBm	1, 2, 4, 5	-96		
			3, 6	-93		
EPRE ratio of PSS to SSS		dB	1, 2, 3, 4, 5, 6	0		
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS						
N_{oc}[Note2]		dBm/15 KHz	1, 2, 3, 4, 5, 6	-100	-104	-100
N_{oc}[Note2]		dBm/SCS	1, 2, 4, 5	-100	-104	-100
			3, 6	-97	-101	-97
$\hat{E}_s/N_{oc}$		dB	1, 2, 3, 4, 5, 6	12	0	-4
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2, 3, 4, 5, 6	12	0	-4
SS-RSRP[Note3]		dBm/SCS	1, 2, 4, 5	-88	-104	-104
			3, 6	-85	-101	-101
Io[Note3]		dBm/9.36 MHz	1, 2, 4, 5	-59.78	-73.04	-70.59
		dBm/38.16 MHz	3, 6	-53.68	-66.9448	-64.49

Propagation condition		1, 2, 3, 4, 5, 6	AWGN
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.6.3.1.4-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2		
			T1	T2	T3

RF channel number		1, 2, 3, 4, 5, 6	2		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration[Note1]		4, 5, 6	6		
TDD uplink-downlink configuration[Note1]		4, 5, 6	1		
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100		
PRACH Configuration[Note2]		1, 2, 3	4		
		4, 5, 6	53		
PDSCH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD		
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD		
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD		
OCNG Patterns[Note3]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD		
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD		
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0		
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA[Note4]					
OCNG_RB[Note4]					
N_{oc}[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-98		
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	8	78
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2, 3, 4, 5, 6	-Infinity	78	78
RSRP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90
SCH_RP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90
Io[Note6]	dBm/9MHz	1, 2, 3, 4, 5, 6	-67.21 +10log($N_{RB,c}$/100)	-58.57 +10log($N_{RB,c}$/100)	-58.57 +10log($N_{RB,c}$/100)
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and Correlation Matrix[Note7]		1, 2, 3, 4, 5, 6	1x2 Low		
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].					

Note 3:	DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 4:	OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 5:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 6:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.4.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 85 ms.

A.6.3.1.5 SA NR - E-UTRAN handover with unknown target cell

A.6.3.1.5.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.5-1. General test parameters are provided in Table A.6.3.1.5-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.5-3 and A.6.3.1.5-4 respectively.

Table A.6.3.1.5-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.5-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement quantity			SS-RSRP	
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
T1		s	≤5	
T2		s	1	

Table A.6.3.1.5-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter	Unit	Configuration	Cell 1	
			T1	T2

RF channel number			1, 2, 3, 4, 5, 6	1	
Duplex mode			1, 4	FDD	
			2, 3, 5, 6	TDD	
TDD Configuration			2, 5	TDDConf.1.1	
			3, 6	TDDConf.2.1	
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)	
			2, 5	10: $N_{RB,c}$ = 52 (TDD)	
			3, 6	40: $N_{RB,c}$ = 106 (TDD)	
PDSCH reference measurement channel			1, 4	SR.1.1 FDD	
			2, 5	SR.1.1 TDD	
			3, 6	SR.2.1 TDD	
CORSET reference channel			1, 4	CR.1.1 FDD	
			2, 5	CR.1.1 TDD	
			3, 6	CR.2.1 TDD	
TRS configuration			1, 4	TRS.1.1 FDD	
			2, 5	TRS.1.1 TDD	
			3, 6	TRS.1.2 TDD	
OCNG pattern[Note1]			1, 2, 3, 4, 5, 6	OP.1	
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	
	Initial UL BWP			ULBWP.0.1	
	Dedicated UL BWP			ULBWP.1.1	
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration			1, 2, 4, 5	SSB.1 FR1	
			3, 6	SSB.2 FR1	
EPRE ratio of PSS to SSS		dB	1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N_{oc}[Note2]		dBm/15 KHz	1, 2, 3, 4, 5, 6	-98	
N_{oc}[Note2]		dBm/SCS	1, 2, 4, 5	-98	
			3, 6	-95	
$\hat{E}_s/N_{oc}$		dB	1, 2, 3, 4, 5, 6	0	0
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2, 3, 4, 5, 6	0	0
SS-RSRP[Note3]		dBm/SCS	1, 2, 4, 5	-98	-98
			3, 6	-95	-95
Io[Note3]		dBm/9.36 MHz	1, 2, 4, 5	-67.04	-67.04
		dBm/38.16 MHz	3, 6	-60.94	-60.94
Propagation condition			1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and Correlation Matrix			1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power					

	spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	$\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.1.5-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	2	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink configuration[Note1]		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PRACH Configuration[Note2]		1, 2, 3	4	
		4, 5, 6	53	
PDSCH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note3]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note4]				
OCNG_RB[Note4]				
N_{oc}[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2, 3, 4, 5, 6	-Infinity	7
RSRP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91
SCH_RP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91
Io[Note6]	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and Correlation Matrix[Note7]		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23]. Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.				

Note 4:	OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 5:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 6:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.5.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

$T_{interrupt}$ = 115 ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 165 ms.

A.6.3.1.6 SA NR - UTRAN FDD handover

A.6.3.1.6.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT UTRAN FDD handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to UTRAN FDD handover requirements as specified in clause 6.1.2.2.1.

The test comprises of one NR carrier and one UTRA FDD carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT UTRAN FDD neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.6-1. General test parameters are provided in Table A.6.3.1.6-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.6-3 and A.6.3.1.6-4 respectively.

Table A.6.3.1.6-1: Supported test configurations for SA inter-RAT UTRAN FDD handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, UTRAN FDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.6-2: General test parameters for SA inter-RAT UTRAN FDD handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in the test
UTRA RF Channel Number			2	1 UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement quantity			SS-RSRP	
Inter-RAT (UTRAN FDD) measurement quantity			CPICH Ec/N0	
b2-Threshold1		dBm	As specified in Table A.6.3.1.6-3	Absolute NR SS-RSRP threshold for event B2
b2-Threshold2-UTRA		dB	-18	Absolute UTRAN CPICH Ec/Io threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		s	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 9.1.2-1 started before T2 starts
T1		s	5	
T2		s	≤5	
T3		s	1	

Table A.6.3.1.6-3: Cell specific test parameters for SA inter-RAT UTRAN FDD handover (Cell 1)

Parameter		Unit	Configuration	Cell 1		
				T1	T2	T3
RF channel number			1, 2, 3	1		
Duplex mode			1	FDD		
			2, 3	TDD		
TDD Configuration			2	TDDConf.1.1		
			3	TDDConf.2.1		
$BW_{channel}$		MHz	1	10: $N_{RB,c}$ = 52 (FDD)		
			2	10: $N_{RB,c}$ = 52 (TDD)		
			3	40: $N_{RB,c}$ = 106 (TDD)		
PDSCH reference measurement channel			1	SR.1.1 FDD		
			2	SR.1.1 TDD		
			3	SR.2.1 TDD		
CORSET reference channel			1	CR.1.1 FDD		
			2	CR.1.1 TDD		
			3	CR.2.1 TDD		
TRS configuration			1	TRS.1.1 FDD		
			2	TRS.1.1 TDD		
			3	TRS.1.2 TDD		
OCNG pattern[Note1]			1, 2, 3	OP.1		
BWP	Initial DL BWP		1, 2, 3	DLBWP.0.1		
	Dedicated DL BWP			DLBWP.1.1		
	Initial UL BWP			ULBWP.0.1		
	Dedicated UL BWP			ULBWP.1.1		
SMTC configuration			1, 2, 3	SMTC.1		
SSB configuration			1, 2	SSB.1 FR1		
			3	SSB.2 FR1		
b2-Threshold1		dBm	1, 2	-96		
			3	-93		
EPRE ratio of PSS to SSS		dB	1, 2, 3	0		
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS						
N_{oc}[Note2]		dBm/15 KHz	1, 2, 3	-100		
N_{oc}[Note2]		dBm/SCS	1, 2,	-100		
			3	-97		
$\hat{E}_s/N_{oc}$		dB	1, 2, 3	012	0-4	0-4
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2, 3	012	0-4	0-4
SS-RSRP[Note3]		dBm/SCS	1, 2	-88	-104	-104
			3	-85	-101	-101
Io[Note3]		dBm/9.36 MHz	1, 2	-59.78	-70.59	-70.59
		dBm/38.16 MHz	3	-53.68	-64.49	-64.49

Propagation condition		1, 2, 3	AWGN
Antenna Configuration and Correlation Matrix		1, 2, 3	1x2 Low
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.6.3.1.6-4: Cell specific test parameters for SA inter-RAT UTRAN FDD handover (Cell 2)

Parameter	Unit	Cell 2 (UTRA)		
		T1	T2	T3
CPICH_Ec/Ior	dB	-10		
PCCPCH_Ec/Ior	dB	-12		
SCH_Ec/Ior	dB	-12		
PICH_Ec/Ior	dB	-15		
DCH_Ec/Ior	dB	N/A	N/A	Note 1
OCNS_Ec/Ior	dB	-0.941	0.941	Note 2
$\hat{I}_{or}/I_{oc}$	dB	-infinity	-1.8	-1.8
I_{oc}	dBm/3,84 MHz	-70	-70	-70
CPICH_Ec/Io	dB	-infinity	-14	-14
Propagation Condition		AWGN		
Note 1: The DPCH level is controlled by the power control loop Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to I_{or}.				

A.6.3.1.6.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 190 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.1.1.1.

$T_{interrupt}$ = 140 ms in the test; $T_{interrupt}$ is defined in clause 5.3.1.1.2. This gives a total of 190 ms.

A.6.3.1.7 Intra-frequency handover in FR1; synchronous scenario

A.6.3.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency DAPS handover requirements in synchronous scenario specified in clause 6.1.3.2.

A.6.3.1.7.2 Test Parameters

Supported test configurations are shown in Table A.6.3.1.7.2-1. Both handover delay and interruption length are tested by using the parameters in Table A.6.3.1.7.2-2, and A.6.3.1.7.2-3.The test consists of five successive time periods, with time durations of T1, T2, T3, T4, and T5 respectively.

Before the start of T1, the UE is connected to the cell1 and not aware of the cell2. During T1, the UE does not have any timing information of the cell2.

Starting T2, the cell2 becomes detectable. During T2, the UE performs cell detection and measurements on the cell2 and shall send event report to the network. After receiving the event report A3, the network sends a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing DAPS handover command is sent to the UE. During T3, UE shall be able to perform random access, DL reception or UL transmission in the cell2 while the DL scheduling and UL feedback in the cell1 shall be avoided. After successful RACH procedure of the cell2, UE is scheduled with PDSCH from cell1 and cell2 in alternative TTIs where both cell1 and cell2 belong to the same TAG. In the end the network sends a RRC message implying cell1 release to the UE. During T3, the handover delay $D_{handover1}$ for target cell addition need to be verified.

The start of T4 is the instant when the last TTI containing cell1 release command is sent to the UE. During T4, the UE shall accomplish the release actions within $D_{handover2}$.

Starting T5, the UE stops sending the periodical CSI report to the cell1.

Table A.6.3.1.7.2-1: Intra-frequency DAPS handover in FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.7.2-2: General test parameters synchronous Intra-frequency DAPS handover in FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤5	
T3		s	1	
T4		ms	$D_{handover2}$	$D_{Handover2}$ is defined in clause 6.1.3.2.1
T5		ms	100	

Table A.6.3.1.7.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency DAPS handover test case

Parameter		Unit	Cell 1					Cell 2				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
NR RF Channel Number			1					1				
Duplex mode	Config 1		FDD									
	Config 2,3		TDD									
TDD configuration	Config 1		Not Applicable									
	Config 2		TDDConf.1.1									
	Config 3		TDDConf.2.1									
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
DRX Cycle		ms	Not Applicable									
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD									
	Config 2		SR.1.1 TDD									
	Config 3		SR2.1 TDD									
CORESET Reference Channel	Config 1		CR.1.1 FDD									
	Config 2		CR.1.1 TDD									
	Config 3		CR2.1 TDD									
TRS configuration	Config 1		TRS.1.1 FDD									
	Config 2		TRS.1.1 TDD									
	Config 3		TRS.1.2 TDD									
OCNG Patterns			OP.1									
SMTC Configuration			SMTC.1									
SSB Configuration	Config 1,2		SSB.1 FR1									
	Config 3		SSB.2 FR1									
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PRACH configuration			FR1 PRACH configuration 1									
BWP configuration	Initial DL BWP		DLBWP.0.1									
	Dedicated DL BWP		DLBWP.1.1									
	Initial UL BWP		ULBWP.0.1									
	Dedicated UL BWP		ULBWP.1.1									
EPRE ratio of PSS to SSS		dB	0									
EPRE ratio of PBCH DMRS to SSS												
EPRE ratio of PBCH to PBCH DMRS												
EPRE ratio of PDCCH DMRS to SSS												
EPRE ratio of PDCCH to PDCCH DMRS												
EPRE ratio of PDSCH DMRS to SSS												
EPRE ratio of PDSCH to PDSCH												

EPRE ratio of OCNG DMRS to SSS(Note 1)												
EPRE ratio of OCNG to OCNG DMRS (Note 1)												
N_{oc} Note2		dBm/15kHz	-98									
N_{oc} Note2	Config 1,2	dBm/SCS	-98									
	Config 3		-95									
$\hat{E}_s/I_{ot}$		dB	8	-1.5	-1.5	-1.5	-1.5	-Infinity	0.36	0.36	0.36	0.36
$\hat{E}_s/N_{oc}$		dB	8	8	8	8	8	-Infinity	9	9	9	9
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	-90	-90	-89	-89	-89	-89	-89
	Config 3	dBm/SCS	-87	-87	-87	-87	-87	-86	-86	-86	-86	-86
Io Note3	Config 1,2	dBm/ 9.36MHz	-61.41	-58.21	-58.21	-58.21	-58.21	-61.41	-58.21	-58.21	-58.21	-58.21
	Config 3	dBm/ 38.16MHz	-55.31	-52.11	-52.11	-52.11	-52.11	-55.31	-52.11	-52.11	-52.11	-52.11
Propagation condition			AWGN									
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.												
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.												
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.												

A.6.3.1.7.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The target cell add delay $D_{handover1}$ can be expressed as: $T_{RRC\_procedure} + T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

T_{search}, T_{IU}, $T_{processing}$, T_{Δ} and T_{margin} are defined in clause 6.1.1.2.2.

If the target cell is known, then T_{search} = 0 ms

T_{IU} = 20 ms in the test. T_{IU} is defined in clause 6.1.1.2.2.

T_{Δ} = 20 ms in the test. T_{Δ} is defined in clause 6.1.1.2.2.

$T_{processing}$ = 20 ms in the test. $T_{processing}$ is defined in clause 6.1.1.2.2.

T_{margin} = 2 ms in the test. T_{margin} is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

After successful RACH to cell 2 and until the start of time period T4, UE shall be able to receive PDSCH alternatively from cell 1 and cell 2. UE is not expected to transmit UL to both cell 1 and cell 2 in the same TTI.

The UE shall release cell 1 less than $D_{handover2} = (T_{RRC\_procedure} + T_{interrupt2})$ from the beginning of time period T4.

NOTE: $D_{handover2}$ is defined in clause 6.1.3.2.1.

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt2}$ is defined in clause 6.1.3.2.2.

UE shall not report CSI to cell 1 during T5.

A.6.3.1.8 Intra-frequency handover in FR1; asynchronous scenario

A.6.3.1.8.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency DAPS handover requirements in asynchronous scenario specified in clause 6.1.3.2.

A.6.3.1.8.2 Test Parameters

Supported test configurations are shown in Table A.6.3.1.8.2-1. Both handover delay and interruption length are tested by using the parameters in Table A.6.3.1.8.2-2, and A.6.3.1.8.2-3.

The test consists of five successive time periods, with time durations of T1, T2, T3, T4, and T5 respectively.

Before the start of T1, the UE is connected to the cell1 and not aware of the cell2. During T1, the UE does not have any timing information of the cell2.

Starting T2, the cell2 becomes detectable. During T2, the UE performs cell detection and measurements on the cell2 and shall send event report to the network. After receiving the event report A3, the network sends a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing DAPS handover command is sent to the UE. During T3, UE shall be able to perform random access, DL reception or UL transmission in the cell2 while the DL scheduling and UL feedback in the cell1 shall be avoided. After successful RACH procedure of the cell2, UE is scheduled with PDSCH from cell1 and cell2 in alternative TTIs where both cell1 and cell2 belong to the same TAG. In the end the network sends a RRC message implying cell1 release to the UE. During T3, the handover delay $D_{handover1}$ for target cell addition needs to be verified.

The start of T4 is the instant when the last TTI containing cell1 release command is sent to the UE by cell2. During T4, the UE shall accomplish the release actions within $D_{handover2}$.

Starting T5, the UE stops sending the periodical CSI report to the cell1.Table A.6.3.1.8.2-1: Intra-frequency DAPS handover in FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.8.2-2: General test parameters Intra-frequency asynchronous DAPS handover in FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			7 μs	Asynchronous cells
T1		s	5	
T2		s	≤5	
T3		s	1	
T4		ms	$D_{handover2}$	$D_{Handover2}$ is defined in clause 6.1.3.2.1
T5		ms	100	

Table A.6.3.1.8.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency DAPS handover test case

Parameter		Unit	Cell 1					Cell 2				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
NR RF Channel Number			1					1				
Duplex mode	Config 1		FDD									
	Config 2,3		TDD									
TDD configuration	Config 1		Not Applicable									
	Config 2		TDDConf.1.1									
	Config 3		TDDConf.2.1									
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
DRX Cycle		ms	Not Applicable									
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD									
	Config 2		SR.1.1 TDD									
	Config 3		SR2.1 TDD									
CORESET Reference Channel	Config 1		CR.1.1 FDD									
	Config 2		CR.1.1 TDD									
	Config 3		CR2.1 TDD									
TRS configuration	Config 1		TRS.1.1 FDD									
	Config 2		TRS.1.1 TDD									
	Config 3		TRS.1.2 TDD									
OCNG Patterns			OP.1									
SMTC Configuration			SMTC.1									
SSB Configuration	Config 1,2		SSB.1 FR1									
	Config 3		SSB.2 FR1									
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PRACH configuration			FR1 PRACH configuration 1									
BWP configuration	Initial DL BWP		DLBWP.0.1									
	Dedicated DL BWP		DLBWP.1.1									
	Initial UL BWP		ULBWP.0.1									
	Dedicated UL BWP		ULBWP.1.1									
EPRE ratio of PSS to SSS		dB	0									
EPRE ratio of PBCH DMRS to SSS												
EPRE ratio of PBCH to PBCH DMRS												
EPRE ratio of PDCCH DMRS to SSS												
EPRE ratio of PDCCH to PDCCH												

DMRS												
EPRE ratio of PDSCH DMRS to SSS												
EPRE ratio of PDSCH to PDSCH												
EPRE ratio of OCNG DMRS to SSS(Note 1)												
EPRE ratio of OCNG to OCNG DMRS (Note 1)												
N_{oc} Note2		dBm/15kHz	-98									
N_{oc} Note2	Config 1,2	dBm/SCS	-98									
	Config 3		-95									
$\hat{E}_s/I_{ot}$		dB	8	-1.5	-1.5	-1.5	-1.5	-Infinity	0.36	0.36	0.36	0.36
$\hat{E}_s/N_{oc}$		dB	8	8	8	8	8	-Infinity	9	9	9	9
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	-90	-90	-89	-89	-89	-89	-89
	Config 3	dBm/SCS	-87	-87	-87	-87	-87	-86	-86	-86	-86	-86
Io Note3	Config 1,2	dBm/ 9.36MHz	-61.41	-58.21	-58.21	-58.21	-58.21	-61.41	-58.21	-58.21	-58.21	-58.21
	Config 3	dBm/ 38.16MHz	-55.31	-52.11	-52.11	-52.11	-52.11	-55.31	-52.11	-52.11	-52.11	-52.11
Propagation condition			AWGN									
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.												

A.6.3.1.8.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The target cell add delay $D_{handover1}$ can be expressed as: $T_{RRC\_procedure} + T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

T_{search}, T_{IU}, $T_{processing}$, T_{Δ} and T_{margin} are defined in clause 6.1.1.2.2.

If the target cell is known, then T_{search} = 0 ms

T_{IU} = 20 ms in the test. T_{IU} is defined in clause 6.1.1.2.2.

T_{Δ} = 20 ms in the test. T_{Δ} is defined in clause 6.1.1.2.2.

$T_{processing}$ = 20 ms in the test. $T_{processing}$ is defined in clause 6.1.1.2.2.

T_{margin} = 2 ms in the test. T_{margin} is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

After successful RACH to cell 2 and until the start of time period T4, UE shall be able to receive PDSCH alternatively from cell 1 and cell 2. UE is not expected to transmit UL to both cell 1 and cell 2 in the same TTI.

The UE shall release cell 1 less than $D_{handover2} = (T_{RRC\_procedure} + T_{interrupt2})$ from the beginning of time period T4.

NOTE: $D_{handover2}$ is defined in clause 6.1.3.2.1.

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt2}$ is defined in clause 6.1.3.2.2.

UE shall not report CSI to cell 1 during T5.

A.6.3.1.9 Intra-band inter-frequency synchronous DAPS handover test in SA for FR1

A.6.3.1.9.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.2.

A.6.3.1.9.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.9.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.9.2-2, and A.6.3.1.9.2-3.

The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. The test scenario comprises of two carriers and one cell on each carrier Gap pattern ID gp0 as specified in Table 9.1.2-1 is configured before T2 in the test case.

Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover. During T3 UE shall be able to perform random access to cell 2. Cell 1 is continuously scheduled in DL during T3. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perfrom DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. At the end of T3 cell 2 shall send an RRC message implying cell 1 release command.

T4 is defined as the end of the last TTI containing the RRC message implying DAPS handover. Cell 2 is continuously scheduled in DL during T4. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell. And the test system shall observe the periodic reporting of CSI for cell 1 during T5.

Table A.6.3.1.9.2-1: Intra-band inter-frequency synchronous DAPS handover in SA for FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.9.2-2: General test parameters for intra-band inter-frequency synchronous DAPS handover test in SA for FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			0 μs	Synchronous cells
T1		s	5	
T2		s	$\leq$5	
T3		s	1	
T4		ms	10 + $T_{interrupt2}$	$T_{interrupt2}$ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5
T5		ms	100	

Table A.6.3.1.9.2-3: Cell specific test parameters for intra-band inter-frequency synchronous DAPS handover test in SA for FR1

Parameter		Unit	Cell 1					Cell 2				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
NR RF Channel Number			1					2				
Duplex mode	Config 1		FDD									
	Config 2,3		TDD									
TDD configuration	Config 1		Not Applicable									
	Config 2		TDDConf.1.1									
	Config 3		TDDConf.2.1									
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
DRx Cycle		ms	Not Applicable									
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD									
	Config 2		SR.1.1 TDD									
	Config 3		SR2.1 TDD									
CORESET Reference Channel	Config 1		CR.1.1 FDD									
	Config 2		CR.1.1 TDD									
	Config 3		CR2.1 TDD									
TRS configuration	Config 1		TRS.1.1 FDD									
	Config 2		TRS.1.1 TDD									
	Config 3		TRS.1.2 TDD									
OCNG Patterns			OP.1									
SMTC Configuration			SMTC.1									
SSB Configuration	Config 1,2		SSB.1 FR1									
	Config 3		SSB.2 FR1									
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PRACH configuration			FR1 PRACH configuration 1									
BWP configuration	Initial DL BWP		DLBWP.0.1									
	Dedicated DL BWP		DLBWP.1.1									
	Initial UL BWP		ULBWP.0.1									
	Dedicated UL BWP		ULBWP.1.1									
EPRE ratio of PSS to SSS		dB	0									
EPRE ratio of PBCH DMRS to SSS												
EPRE ratio of PBCH to PBCH DMRS												
EPRE ratio of PDCCH DMRS to SSS												
EPRE ratio of PDCCH to PDCCH DMRS												
EPRE ratio of PDSCH DMRS to SSS												
EPRE ratio of PDSCH to PDSCH												
EPRE ratio of OCNG DMRS to SSS(Note 1)												
EPRE ratio of OCNG to OCNG DMRS (Note 1)												
N_{oc} Note2		dBm/15kHz	-98									
N_{oc} Note2	Config 1,2	dBm/SCS	-98									

	Config 3		-95									
$\hat{E}_s/I_{ot}$		dB	8	8	8	8	8	-Infinity	8	8	8	8
$\hat{E}_s/N_{oc}$		dB	8	8	8	8	8	-Infinity	8	8	8	8
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	-90	-90	-Infinity	-90	-90	-90	-90
	Config 3	dBm/SCS	-87	-87	-87	-87	-87	-Infinity	-87	-87	-87	-87
Io[Note3]	Config 1,2	dBm/ 9.36MHz	-61.41	-61.41	-61.41	-61.41	-61.41	-70.05	-61.41	-61.41	-61.41	-61.41
	Config 3	dBm/ 38.16MHz	-55.31	-55.31	-55.31	-55.31	-55.31	-63.94	-55.31	-55.31	-55.31	-55.31
Propagation condition		-	AWGN					AWGN				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.												

A.6.3.1.9.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

During T3 UE is allowed to cause $T_{interrupt1}$ interruption to cell 1. $T_{interrupt1}$ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-2. When UE is transmitting PRACH preamble to cell 2, interruption to cell 1 is allowed.

During T4 UE is allowed to cause $T_{interrupt2}$ interruption to cell 1. $T_{interrupt2}$ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5.

UE shall finish cell 1 release in T4 and shall not send any CSI reports to cell 1 during T5.

The rate of correct handovers observed during repeated tests shall be at least 90%.

A.6.3.1.10 Intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

A.6.3.1.10.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.2.

A.6.3.1.10.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.10.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.10.2-2, and A.6.3.1.10.2-3.

The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. The test scenario comprises of two carriers and one cell on each carrier Gap pattern ID gp0 as specified in Table 9.1.2-1 is configured before T2 in the test case.

Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover.During T3 UE shall be able to perform random access to cell 2. Cell 1 is continuously scheduled in DL during T3. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perfrom DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. At the end of T3 cell 2 shall send an RRC message implying cell 1 release command.

T4 is defined as the end of the last TTI containing the RRC message implying DAPS handover. Cell 2 is continuously scheduled in DL during T4. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell. Andthe test system shall observe the periodic reporting of CSI for cell 1 during T5.

Table A.6.3.1.10.2-1: Intra-band inter-frequency asynchronous DAPS handover in SA for FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.10.2-2: General test parameters for intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			10 μs	Asynchronous cells
T1		s	5	
T2		s	≤5	
T3		s	1	
T4		ms	10 + $T_{interrupt2}$	$T_{interrupt2}$ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5
T5		ms	100	

Table A.6.3.1.10.2-3: Cell specific test parameters for intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

Parameter		Unit	Cell 1					Cell 2				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
NR RF Channel Number			1					2				
Duplex mode	Config 1		FDD									
	Config 2,3		TDD									
TDD configuration	Config 1		Not Applicable									
	Config 2		TDDConf.1.1									
	Config 3		TDDConf.2.1									
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52									
	Config 2		10: $N_{RB,c}$ = 52									
	Config 3		40: $N_{RB,c}$ = 106									
DRx Cycle		ms	Not Applicable									
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD									
	Config 2		SR.1.1 TDD									
	Config 3		SR2.1 TDD									
CORESET Reference Channel	Config 1		CR.1.1 FDD									
	Config 2		CR.1.1 TDD									
	Config 3		CR2.1 TDD									
TRS configuration	Config 1		TRS.1.1 FDD									
	Config 2		TRS.1.1 TDD									
	Config 3		TRS.1.2 TDD									
OCNG Patterns			OP.1									
SMTC Configuration			SMTC.1									
SSB Configuration	Config 1,2		SSB.1 FR1									
	Config 3		SSB.2 FR1									
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz									
	Config 3		30 kHz									
PRACH configuration			FR1 PRACH configuration 1									
BWP configuration	Initial DL BWP		DLBWP.0.1									
	Dedicated DL BWP		DLBWP.1.1									
	Initial UL BWP		ULBWP.0.1									
	Dedicated UL BWP		ULBWP.1.1									
EPRE ratio of PSS to SSS		dB	0									
EPRE ratio of PBCH DMRS to SSS												
EPRE ratio of PBCH to PBCH DMRS												
EPRE ratio of PDCCH DMRS to SSS												
EPRE ratio of PDCCH to PDCCH DMRS												
EPRE ratio of PDSCH DMRS to SSS												
EPRE ratio of PDSCH to PDSCH												
EPRE ratio of OCNG DMRS to SSS(Note 1)												
EPRE ratio of OCNG to OCNG DMRS (Note 1)												
N_{oc} Note2		dBm/15kHz	-98									
N_{oc} Note2	Config 1,2	dBm/SCS	-98									
	Config 3		-95									
$\hat{E}_s/I_{ot}$		dB	8	8	8	8	8	-	8	8	8	8

								Infinity				
$\hat{E}_s/N_{oc}$		dB	8	8	8	8	8	-Infinity	8	8	8	8
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	-90	-90	-Infinity	-90	-90	-90	-90
	Config 3	dBm/SCS	-87	-87	-87	-87	-87	-Infinity	-87	-87	-87	-87
Io[Note3]	Config 1,2	dBm/ 9.36MHz	-61.41	-61.41	-61.41	-61.41	-61.41	-70.05	-61.41	-61.41	-61.41	-61.41
	Config 3	dBm/ 38.16MHz	-55.31	-55.31	-55.31	-55.31	-55.31	-63.94	-55.31	-55.31	-55.31	-55.31
Propagation condition		-	AWGN					AWGN				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.												

A.6.3.1.10.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

During T3 UE is allowed to cause $T_{interrupt1}$ interruption to cell 1. $T_{interrupt1}$ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-2. When UE is transmitting PRACH preamble to cell 2, interruption to cell 1 is allowed.

During T4 UE is allowed to cause $T_{interrupt2}$ interruption to cell 1. $T_{interrupt2}$ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5.

UE shall finish cell 1 release in T4 and shall not send any CSI reports to cell 1 during T5.

The rate of correct handovers observed during repeated tests shall be at least 90%.

A.6.3.1.11 Inter-band inter-frequency synchronous DAPS handover from FR1 to FR1

A.6.3.1.11.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR1 inter-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.2.

A.6.3.1.11.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.11.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.11.2-2, A.6.3.1.11.2-3 and A.6.3.1.11.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC m`essage implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

Table A.6.3.1.11.2-1: Inter-band inter-frequency synchronous DAPS handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
4	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
5	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
7	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
8	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
9	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.11.2-2: General test parameters for inter-band inter-frequency synchronous DAPS handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	PCell on RF channel number 1
	Neighbouring cell		Cell 2	Neighbour cell on RF channel number 2
Final condition	Active cell		Cell 2	PCell on RF channel number 2
	Neighbouring cell		Cell 1	Neighbour cell on RF channel number 1
A3-Offset		dB	-6	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells		μs	33	Synchronous cells
DRX			OFF	
Measurement gap pattern Id			#0	Gaps are configured before T2.
T1		s	5	
T2		s	<5	
T3		s	<0.5	
T4		ms	$10+T_{interrupt2}$	$T_{interrupt2}$ as defined in Table 6.1.3.2.2-6 for synchronous DAPS HO
T5		ms	100	

Table A.6.3.1.11.2-3: Cell specific test parameters for inter-band inter-frequency synchronous DAPS handover from FR1 to FR1 (Cell 1)

Parameter	Unit	Cell 1				
		T1	T2	T3	T4	T5

NR RF Channel Number			1				
Duplex mode	Config 1,4,7		FDD				
	Config 2,3,5,6,8,9		TDD				
TDD configuration	Config 1,4,7		Not Applicable				
	Config 2,5,8		TDDConf.1.1				
	Config 3,6,9		TDDConf.2.1				
$BW_{channel}$	Config 1,4,7	MHz	10: $N_{RB,c}$ = 52				
	Config 2,5,8		10: $N_{RB,c}$ = 52				
	Config 3,6,9		40: $N_{RB,c}$ = 106				
BWP BW	Config 1,4,7	MHz	10: $N_{RB,c}$ = 52				
	Config 2,5,8		10: $N_{RB,c}$ = 52				
	Config 3,6,9		40: $N_{RB,c}$ = 106				
TRS configuration	Config 1,4,7		TRS.1.1 FDD				
	Config 2,5,8		TRS.1.1 TDD				
	Config 3,6,9		TRS.1.2 TDD				
DRX Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1,4,7		SR.1.1 FDD				
	Config 2,5,8		SR.1.1 TDD				
	Config 3,6,9		SR2.1 TDD				
CORESET Reference Channel	Config 1,4,7		CR.1.1 FDD				
	Config 2,5,8		CR.1.1 TDD				
	Config 3,6,9		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
SMTC Configuration			SMTC pattern 1				
SSB Configuration	Config 1,2,4,5,7,8		SSB.1 FR1				
	Config 3,6,9		SSB.2 FR1				
PDSCH/PDCCH subcarrier spacing	Config 1,2,4,5,7,8	kHz	15 kHz				
	Config 3,6,9		30 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2,4,5,7,8	kHz	15 kHz				
	Config 3,6,9		30 kHz				
PRACH configuration			FR1 PRACH configuration 2				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	-98	-98	-98	-98	-98
N_{oc} Note2	Config 1,2,4,5,7,8	dBm/SCS	-98	-98	-98	-98	-98
	Config 3,6,9		-95	-95	-95	-95	-95
$\hat{E}_s/I_{ot}$		dB	4	4	4	4	4
$\hat{E}_s/N_{oc}$		dB	4	4	4	4	4
SSB_RP	Config 1,2,4,5,7,8	dBm/SCS	-94	-94	-94	-94	-94
	Config 3,6,9	dBm/SCS	-91	-91	-91	-91	-91
Io Note3	Config 1,2,4,5,7,8	dBm/	-64.59	-64.59	-64.59	-64.59	-64.59

		9.36MHz					
	Config 3,6,9	dBm/ 38.16MHz	-58.49	-58.49	-58.49	-58.49	-58.49
Propagation condition		-	AWGN				
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							

Table A.6.3.1.11.2-4: Cell specific test parameters for inter-band inter-frequency synchronous DAPS handover from FR1 to FR1 (Cell 2)

Parameter		Unit	Cell 2				
			T1	T2	T3	T4	T5
NR RF Channel Number			2				
Duplex mode	Config 1,2,3		FDD				
	Config 4,5,6,7,8,9		TDD				
TDD configuration	Config 1,2,3		Not Applicable				
	Config 4,5,6		TDDConf.1.1				
	Config 7,8,9		TDDConf.2.1				
$BW_{channel}$	Config 1,2,3	MHz	10: $N_{RB,c}$ = 52				
	Config 4,5,6		10: $N_{RB,c}$ = 52				
	Config 7,8,9		40: $N_{RB,c}$ = 106				
BWP BW	Config 1,2,3	MHz	10: $N_{RB,c}$ = 52				
	Config 4,5,6		10: $N_{RB,c}$ = 52				
	Config 7,8,9		40: $N_{RB,c}$ = 106				
TRS configuration	Config 1,2,3		TRS.1.1 FDD				
	Config 4,5,6		TRS.1.1 TDD				
	Config 7,8,9		TRS.1.2 TDD				
DRx Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1,2,3		SR.1.1 FDD				
	Config 4,5,6		SR.1.1 TDD				
	Config 7,8,9		SR2.1 TDD				
CORESET Reference Channel	Config 1,2,3		CR.1.1 FDD				
	Config 4,5,6		CR.1.1 TDD				
	Config 7,8,9		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
SMTC Configuration			SMTC pattern 1				
SSB Configuration	Config 1,2,3,4,5,6		SSB.1 FR1				
	Config 7,8,9		SSB.2 FR1				
PDSCH/PDCCH subcarrier spacing	Config 1,2,3,4,5,6	kHz	15 kHz				
	Config 7,8,9		30 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2,3,4,5,6	kHz	15 kHz				
	Config 7,8,9		30 kHz				
PRACH configuration			FR1 PRACH configuration 2				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	-98	-98	-98	-98	-98
N_{oc} Note2	Config 1,2,3,4,5,6	dBm/SCS	-98	-98	-98	-98	-98
	Config 7,8,9		-95	-95	-95	-95	-95

$\hat{E}_s/I_{ot}$		dB	-Infinity	4	4	4	4
$\hat{E}_s/N_{oc}$		dB	-Infinity	4	4	4	4
SSB_RP	Config 1,2,3,4,5,6	dBm/SCS	-Infinity	-94	-94	-94	-94
	Config 7,8,9	dBm/SCS	-Infinity	-91	-91	-91	-91
Io Note3	Config 1,2,3,4,5,6	dBm/ 9.36MHz	-70.05	-64.59	-64.59	-64.59	-64.59
	Config 7,8,9	dBm/ 38.16MHz	-63.94	-58.49	-58.49	-58.49	-58.49
Propagation condition		-	AWGN				
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							

A.6.3.1.11.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3. During $D_{handover1}$, the interruption on Cell 1 shall not exceed $T_{interrupt1}$ as defined in Table 6.1.3.2.2-3 for synchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $T_{RRC\_procedure} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

T_{IU} = 20 ms in the test. T_{IU} is defined in clause 6.1.1.2.2.

T_{Δ} = 20 ms in the test. T_{Δ} is defined in clause 6.1.1.2.2.

$T_{processing}$ = 20 ms in the test. $T_{processing}$ is defined in clause 6.1.1.2.2.

T_{margin} = 2 ms in the test. T_{margin} is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

The UE shall complete to release Cell 1 less than (10 ms + $T_{interrupt2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed $T_{interrupt2}$ as defined in Table 6.1.3.2.2-6 for synchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC\_procedure} + T_{interrupt2}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

A.6.3.1.12 Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1

A.6.3.1.12.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR1 inter-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.2.

A.6.3.1.12.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.12.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.12.2-2, A.6.3.1.12.2-3 and A.6.3.1.12.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

Table A.6.3.1.12.2-1: Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
4	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
5	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
7	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
8	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
9	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.1.12.2-2: General test parameters for inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	-4	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells	Config 1,2,4,5	ms	0.5	Asynchronous cells
	Config3,6,7,8,9	ms	0.25	
DRX			OFF	
Measurement gap pattern Id			#0	Gaps are configured before T2.
T1		s	5	
T2		s	<5	
T3		s	<0.5	
T4		ms	$10+T_{interrupt2}$	$T_{interrupt2}$ as defined in Table 6.1.3.2.2-6 for asynchronous DAPS HO.
T5		ms	100	

Table A.6.3.1.12.2-3: Cell specific test parameters for inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1 (Cell 1)

Parameter		Unit	Cell 1				
			T1	T2	T3	T4	T5
NR RF Channel Number			1				
Duplex mode	Config 1,4,7		FDD				
	Config 2,3,5,6,8,9		TDD				
TDD configuration	Config 1,4,7		Not Applicable				
	Config 2,5,8		TDDConf.1.1				
	Config 3,6,9		TDDConf.2.1				
$BW_{channel}$	Config 1,4,7	MHz	10: $N_{RB,c}$ = 52				
	Config 2,5,8		10: $N_{RB,c}$ = 52				
	Config 3,6,9		40: $N_{RB,c}$ = 106				
BWP BW	Config 1,4,7	MHz	10: $N_{RB,c}$ = 52				
	Config 2,5,8		10: $N_{RB,c}$ = 52				
	Config 3,6,9		40: $N_{RB,c}$ = 106				
TRS configuration	Config 1,4,7		TRS.1.1 FDD				
	Config 2,5,8		TRS.1.1 TDD				
	Config 3,6,9		TRS.1.2 TDD				
DRX Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1,4,7		SR.1.1 FDD				
	Config 2,5,8		SR.1.1 TDD				
	Config 3,6,9		SR2.1 TDD				
CORESET Reference Channel	Config 1,4,7		CR.1.1 FDD				
	Config 2,5,8		CR.1.1 TDD				
	Config 3,6,9		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
SMTC Configuration			SMTC pattern 1				
SSB Configuration	Config 1,2,4,5,7,8		SSB.1 FR1				
	Config 3,6,9		SSB.2 FR1				
PDSCH/PDCCH subcarrier spacing	Config 1,2,4,5,7,8	kHz	15 kHz				
	Config 3,6,9		30 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2,4,5,7,8	kHz	15 kHz				
	Config 3,6,9		30 kHz				
PRACH configuration			FR1 PRACH configuration 2				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	-98	-98	-98	-98	-98
N_{oc} Note2	Config 1,2,4,5,7,8	dBm/SCS	-98	-98	-98	-98	-98

	Config 3,6,9		-95	-95	-95	-95	-95
$\hat{E}_s/I_{ot}$		dB	4	4	4	4	4
$\hat{E}_s/N_{oc}$		dB	4	4	4	4	4
SSB_RP	Config 1,2,4,5,7,8	dBm/SCS	-94	-94	-94	-94	-94
	Config 3,6,9	dBm/SCS	-91	-91	-91	-91	-91
Io Note3	Config 1,2,4,5,7,8	dBm/ 9.36MHz	-64.59	-64.59	-64.59	-64.59	-64.59
	Config 3,6,9	dBm/ 38.16MHz	-58.49	-58.49	-58.49	-58.49	-58.49
Propagation condition		-	AWGN				
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							

Table A.6.3.1.12.2-4: Cell specific test parameters for inter-band inter-frequency asynchronous DAPS handover from FR1 to FR1 (Cell 2)

Parameter	Unit	Cell 2				
		T1	T2	T3	T4	T5

NR RF Channel Number			2				
Duplex mode	Config 1,2,3		FDD				
	Config 4,5,6,7,8,9		TDD				
TDD configuration	Config 1,2,3		Not Applicable				
	Config 4,5,6		TDDConf.1.1				
	Config 7,8,9		TDDConf.2.1				
$BW_{channel}$	Config 1,2,3	MHz	10: $N_{RB,c}$ = 52				
	Config 4,5,6		10: $N_{RB,c}$ = 52				
	Config 7,8,9		40: $N_{RB,c}$ = 106				
BWP BW	Config 1,2,3	MHz	10: $N_{RB,c}$ = 52				
	Config 4,5,6		10: $N_{RB,c}$ = 52				
	Config 7,8,9		40: $N_{RB,c}$ = 106				
TRS configuration	Config 1,2,3		TRS.1.1 FDD				
	Config 4,5,6		TRS.1.1 TDD				
	Config 7,8,9		TRS.1.2 TDD				
DRx Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1,2,3		SR.1.1 FDD				
	Config 4,5,6		SR.1.1 TDD				
	Config 7,8,9		SR2.1 TDD				
CORESET Reference Channel	Config 1,2,3		CR.1.1 FDD				
	Config 4,5,6		CR.1.1 TDD				
	Config 7,8,9		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
SMTC Configuration			SMTC pattern 1				
SSB Configuration	Config 1,2,3,4,5,6		SSB.1 FR1				
	Config 7,8,9		SSB.2 FR1				
PDSCH/PDCCH subcarrier spacing	Config 1,2,3,4,5,6	kHz	15 kHz				
	Config 7,8,9		30 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2,3,4,5,6	kHz	15 kHz				
	Config 7,8,9		30 kHz				
PRACH configuration			FR1 PRACH configuration 2				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	-98	-98	-98	-98	-98
N_{oc} Note2	Config 1,2,3,4,5,6	dBm/SCS	-98	-98	-98	-98	-98
	Config 7,8,9		-95	-95	-95	-95	-95
$\hat{E}_s/I_{ot}$		dB	-Infinity	4	4	4	4
$\hat{E}_s/N_{oc}$		dB	-Infinity	4	4	4	4
SSB_RP	Config 1,2,3,4,5,6	dBm/SCS	-Infinity	-94	-94	-94	-94

	Config 7,8,9	dBm/SCS	-Infinity	-91	-91	-91	-91
Io[Note3]	Config 1,2,3,4,5,6	dBm/ 9.36MHz	-70.05	-64.59	-64.59	-64.59	-64.59
	Config 7,8,9	dBm/ 38.16MHz	-63.94	-58.49	-58.49	-58.49	-58.49
Propagation condition		-	AWGN				
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							

A.6.3.1.12.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3. During $D_{handover1}$, the interruption on Cell 1 shall not exceed $T_{interrupt1}$ as defined in Table 6.1.3.2.2-3 for asynchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $T_{RRC\_procedure} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

T_{IU} = 20 ms in the test. T_{IU} is defined in clause 6.1.1.2.2.

T_{Δ} = 20 ms in the test. T_{Δ} is defined in clause 6.1.1.2.2.

$T_{processing}$ = 20 ms in the test. $T_{processing}$ is defined in clause 6.1.1.2.2.

T_{margin} = 2 ms in the test. T_{margin} is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

The UE shall complete to release Cell 1 less than (10 ms + $T_{interrupt2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed $T_{interrupt2}$ as defined in Table 6.1.3.2.2-6 for asynchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC\_procedure} + T_{interrupt2}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

A.6.3.2 RRC Connection Mobility Control

A.6.3.2.1 SA: RRC Re-establishment

A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period

T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer;
T311		ms	1, 2, 3	3000	RRC re-establishment timer
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle length		s	1, 2, 3	OFF	
PRACH configuration			1, 2, 3	FR1 PRACH configuration 1	Table A.3.8.2.1-1
T1		s	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		s	1, 2, 3	2	

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD		
		2	SR.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 FDD		
		2	CR.1.1 TDD			CR.1.1 TDD		
		3	CR.2.1 TDD			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 FDD		
		2	CCR.1.1 TDD			CCR.1.1 TDD		
		3	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
TRS configuration		1	TRS.1.1 FDD			TRS.1.1 FDD		
		2	TRS.1.1 TDD			TRS.1.1 TDD		
		3	TRS.1.2 TDD			TRS.1.2 TDD		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
Active DL BWP confgiuration		1, 2, 3	DLBWP.1.1	N/A	N/A	N/A	N/A	DLBWP.1.1
Active UL BWP configuration		1, 2, 3	ULBWP.1.1	N/A	N/A	N/A	N/A	ULBWP.1.1
RLM-RS		1, 2, 3	SSB			SSB		
$\hat{E}_s/I_{ot}$	dB	1	1.54	-infinity	-infinity	-3.79	4	4
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-98					
		2	-98					
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	7	-infinity	-infinity	4	4	4
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94
		2	-91	-infinity	-infinity	-94	-94	-94
		3	-88	-infinity	-infinity	-91	-91	-91
Io	dBm/9.36 MHz	1	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/9.36 MHz	2	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/38.16 MHz	3	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagation Condition		1, 2, 3	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than 1.6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish\_delay} = T_{UL\_grant} + T_{UE\_re\text{-}establish\_delay}.$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

N_{freq} = 1

$T_{identify\_intra\_NR}$ = 200 ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.6.3.2.1.2.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1, 2	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer;
T311		ms	1, 2, 3	5000	RRC re-establishment timer
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle length		s	1, 2, 3	OFF	
PRACH configuration			1, 2, 3	FR1 PRACH configuration 1	Table A.3.8.2.1-1
T1		s	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		s	1, 2, 3	5	

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
RF Channel Number		1, 2, 3	1			2		
TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD		
		2	SR.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 FDD		
		2	CR.1.1 TDD			CR.1.1 TDD		
		3	CR.2.1 TDD			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 FDD		
		2	CCR.1.1 TDD			CCR.1.1 TDD		
		3	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
TRS configuration		1	TRS.1.1 FDD			TRS.1.1 FDD		
		2	TRS.1.1 TDD			TRS.1.1 TDD		
		3	TRS.1.2 TDD			TRS.1.2 TDD		
Initial DL BWP configuration		1, 2, 3	DLBWP.0			DLBWP.0		
Initial UL BWP configuration		1, 2, 3	ULBWP.0			ULBWP.0		
Active DL BWP confgiuration		1, 2, 3	DLBWP.1.1	N/A	N/A	N/A	N/A	DLBWP.1.1
Active UL BWP configuration		1, 2, 3	ULBWP.1.1	N/A	N/A	N/A	N/A	ULBWP.1.1
RLM-RS		1, 2, 3	SSB			SSB		
$\hat{E}_s/I_{ot}$	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-98					
		2	-98					
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-91
		2	-94	-infinity	-infinity	-infinity	-infinity	-91
		3	-91	-infinity	-infinity	-infinity	-infinity	-88
Io	dBm/9.36 MHz	1	-64.59	-70. 05	-70. 05	-70. 05	-70. 05	-62.26
	dBm/9.36 MHz	2	-64.59	-70. 05	-70. 05	-70. 05	-70.05	-62.26
	dBm/38.16 MHz	3	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15
Propagation Condition		1, 2, 3	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish\_delay} = T_{UL\_grant} + T_{UE\_re\text{-}establish\_delay}.$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay} = 50\ ms + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

$N_{freq} = 2$

$T_{identify\_intra\_NR}$ = 800 ms

$T_{identify\_inter\_NR}$ = 800 ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channel Number			1, 2, 3	1	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	6000	Radio link failure timer configured by *RLF-TimersAndConstants*
T311		ms	1, 2, 3	3000	RRC re-establishment timer
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC configuration			1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle length		s	1, 2, 3	OFF	
PRACH configuration			1, 2, 3	FR1 PRACH configuration 1	Table A.3.8.2.1-1
T1		s	1, 2, 3	5	
T2		s	1, 2, 3	6	Time for the UE to detect RLF
T3		s	1, 2, 3	3	

Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th rowspan="2">Test configuration</th><th colspan="3">Cell 1</th><th colspan="3">Cell 2</th></tr>
<tr><th>T1</th><th>T2</th><th>T3</th><th>T1</th><th>T2</th><th>T3</th></tr>
<tr><td rowspan="3">TDD configuration</td><td rowspan="3"></td><td>1</td><td colspan="3">N/A</td><td colspan="3">N/A</td></tr>
<tr><td>2</td><td colspan="3">TDDConf.1.1</td><td colspan="3">TDDConf.1.1</td></tr>
<tr><td>3</td><td colspan="3">TDDConf.2.1</td><td colspan="3">TDDConf.2.1</td></tr>
<tr><td rowspan="3">PDSCH RMC configuration</td><td rowspan="3"></td><td>1</td><td colspan="3">SR.1.1 FDD</td><td colspan="3">SR.1.1 FDD</td></tr>
<tr><td>2</td><td colspan="3">SR.1.1 TDD</td><td colspan="3">SR.1.1 TDD</td></tr>
<tr><td>3</td><td colspan="3">SR.2.1 TDD</td><td colspan="3">SR.2.1 TDD</td></tr>
<tr><td rowspan="3">RMSI CORESET RMC configuration</td><td rowspan="3"></td><td>1</td><td colspan="3">CR.1.1 FDD</td><td colspan="3">CR.1.1 FDD</td></tr>
<tr><td>2</td><td colspan="3">CR.1.1 TDD</td><td colspan="3">CR.1.1 TDD</td></tr>
<tr><td>3</td><td colspan="3">CR.2.1 TDD</td><td colspan="3">CR.2.1 TDD</td></tr>
<tr><td rowspan="3">Dedicated CORESET RMC configuration</td><td rowspan="3"></td><td>1</td><td colspan="3">CCR.1.1 FDD</td><td colspan="3">CCR.1.1 FDD</td></tr>
<tr><td>2</td><td colspan="3">CCR.1.1 TDD</td><td colspan="3">CCR.1.1 TDD</td></tr>
<tr><td>3</td><td colspan="3">CCR.2.1 TDD</td><td colspan="3">CCR.2.1 TDD</td></tr>
<tr><td>OCNG Pattern</td><td></td><td>1, 2, 3</td><td colspan="3">OP.1 defined in A.3.2.1</td><td colspan="3">OP.1 defined in A.3.2.1</td></tr>
<tr><td>Initial DL BWP configuration</td><td></td><td>1, 2, 3</td><td colspan="3">DLBWP.0.1</td><td colspan="3">DLBWP.0.1</td></tr>
<tr><td>Initial UL BWP configuration</td><td></td><td>1, 2, 3</td><td colspan="3">ULBWP.0.1</td><td colspan="3">ULBWP.0.1</td></tr>
<tr><td>RLM-RS</td><td></td><td>1, 2, 3</td><td colspan="3">SSB</td><td colspan="3">SSB</td></tr>
<tr><td rowspan="3">$\hat{E}_s/I_{ot}$</td><td rowspan="3">dB</td><td>1</td><td rowspan="3">4</td><td rowspan="3">-infinity</td><td rowspan="3">-infinity</td><td rowspan="3">-infinity</td><td rowspan="3">-infinity</td><td rowspan="3">4</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td rowspan="3">N_{oc} Note2</td><td rowspan="3">dBm/SCS</td><td>1</td><td colspan="6">-98</td></tr>
<tr><td>2</td><td colspan="6">-98</td></tr>
<tr><td>3</td><td colspan="6">-95</td></tr>
<tr><td rowspan="3">N_{oc} Note2</td><td rowspan="3">dBm/15 kHz</td><td>1</td><td colspan="6" rowspan="3">-98</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td rowspan="3">$\hat{E}_s/N_{oc}$</td><td rowspan="3">dB</td><td>1</td><td rowspan="3">4</td><td rowspan="3">-infinity</td><td rowspan="3">-infinity</td><td rowspan="3">-infinity</td><td rowspan="3">-infinity</td><td rowspan="3">4</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td rowspan="3">SS-RSRP Note3</td><td rowspan="3">dBm/SCS</td><td>1</td><td>-94</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-94</td></tr>
<tr><td>2</td><td>-94</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-94</td></tr>
<tr><td>3</td><td>-91</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-91</td></tr>
<tr><td rowspan="3">Io</td><td>dBm/9.36 MHz</td><td>1</td><td>-64.59</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-64.59</td></tr>
<tr><td>dBm/9.36 MHz</td><td>2</td><td>-64.59</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-64.59</td></tr>
<tr><td>dBm/38.16 MHz</td><td>3</td><td>-58.50</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-infinity</td><td>-58.50</td></tr>
<tr><td>Propagation Condition</td><td></td><td>1, 2, 3</td><td colspan="6">AWGN</td></tr>
<tr><td colspan="9">Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.</td></tr>
</table>

A.6.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 2.2 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish\_delay} = T_{UL\_grant} + T_{UE\_re\text{-}establish\_delay}.$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay} = 50\text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

$N_{freq} = 1$

$T_{identify\_intra\_NR}$ = 800 ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2145 ms, allow 2.2 s in the test case.

A.6.3.2.2 Random Access

A.6.3.2.2.1 4-step RA type contention based random access test in FR1 for NR standalone

A.6.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.1.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.1.1-2.

Table A.6.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.6.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone

Parameter			Unit	Test-1	Comments
SSB Configuration		Config 1		SSB pattern 1 in FR1	As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below
		Config 2		SSB pattern 2 in FR1	
Number of SSBs per SS-burst				2	Different from the definition in A.3.10
SS/PBCH block index				0,1	Different from the definition in A.3.10
Duplex Mode for Cell 1		Config 1		FDD	
		Config 2		TDD	
TDD Configuration		Config 2		TDDConf.2.1	
CSI-RS for tracking		Config 1		TRS.1.1 FDD	
		Config 2		TRS.1.2 TDD	
OCNG Pattern Note 1				OP.1	As defined in A.3.2.1.
PDSCH parameters Note 4		Config 1		SR.1.1 FDD	As defined in A.3.1.1.
		Config 2		SR.2.1 TDD	
RMSI CORESET Reference Channel		Config 1		CR.1.1 FDD	
		Config 2		CR.2.1 TDD	
Dedicated CORESET Reference Channel		Config 1		CCR.1.1 FDD	
		Config 2		CCR.2.1 TDD	
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-98	
		Config 2		-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP Note 3		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-98	
		Config 2		-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP Note 3		dBm/ SCS	-115	
Io Note 2		Config 1	dBm	-65.3/9.36MHz	For symbols without SSB index 1
		Config 2		-62.2/38.16MHz	
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause

			6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\text{CMAX, f, c}}$)	dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration		FR1 PRACH configuration 1	As defined in A.3.8.
Propagation Condition	-	AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel. Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters. Note 3: Void Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.			

A.6.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.6.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A. 6.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.6.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.6.3.2.2.2 4-step RA type non-contention based random access test in FR1 for NR standalone

A.6.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.2.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.6.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.6.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

Parameter			Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1			SSB pattern 1 in FR1	SSB pattern 1 in FR1	As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below
	Config 2			SSB pattern 2 in FR1	SSB pattern 2 in FR1	
Number of SSBs per SS-burst				2	2	Different from the definition in A.3.10
SS/PBCH block index				0,1	0,1	Different from the definition in A.3.10
CSI-RS Configuration	Config 1			N/A	CSI-RS.1.1 FDD	As defined in A.3.1.4
	Config 2				CSI-RS.2.1 TDD	
Duplex Mode for Cell 1	Config 1			FDD	FDD	
	Config 2			TDD	TDD	
TDD Configuration	Config 2			TDDConf.2.1	TDDConf.2.1	
CSI-RS for tracking	Config 1			TRS.1.1 FDD	TRS.1.1 FDD	
	Config 2			TRS.1.2 TDD	TRS.1.2 TDD	
OCNG Pattern Note 1				OP.1	OP.1	As defined in A.3.2.1.
PDSCH parameters Note 4	Config 1			SR.1.1 FDD	SR.1.1 FDD	As defined in A.3.1.1.
	Config 2			SR.2.1 TDD	SR.2.1 TDD	
RMSI CORESET Reference Channel	Config 1			CR.1.1 TDD	CR.1.1 TDD	
	Config 2			CR.2.1 TDD	CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1			CCR.1.1 TDD	CCR.1.1 TDD	
	Config 2			CCR.2.1 TDD	CCR.2.1 TDD	
NR RF Channel Number				1	1	
EPRE ratio of PSS to SSS			dB	0	0	
EPRE ratio of PBCH_DMRS to SSS			dB			
EPRE ratio of PBCH to PBCH_DMRS			dB			
EPRE ratio of PDCCH_DMRS to SSS			dB			
EPRE ratio of PDCCH to PDCCH_DMRS			dB			
EPRE ratio of PDSCH_DMRS to SSS			dB			
EPRE ratio of PDSCH to PDSCH_DMRS			dB			
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	3	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-98	-98	
		Config 2		-101	-101	
	$\hat{E}_s/N_{oc}$		dB	3	3	
	SS-RSRP Note 3		dBm/ SCS	-95	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	-17	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-98	-98	
		Config 2		-101	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	-17	
	SS-RSRP Note 3		dBm/ SCS	-115	-115	

Io Note 2	Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without SSB index 1
	Config 2		-62.2/38.16MHz	-62.2/38.16MHz	
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\mathrm{CMAX,\,f,\,c}}$)		dBm	23	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.
Propagation Condition		-	AWGN	AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel. Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters. Note 3: Void Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.					

A.6.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.6.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.3 2-step RA type contention based random access test in FR1 for NR standalone

A.6.3.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.3.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.3.1-2.

Table A.6.3.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.6.3.2.2.3.1-2: General test parameters for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

Parameter			Unit	Test-1	Comments
SSB Configuration	Config 1			SSB pattern 1 in FR1	As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below
	Config 2			SSB pattern 2 in FR1	
Number of SSBs per SS-burst				2	Different from the definition in A.3.10
SS/PBCH block index				0,1	Different from the definition in A.3.10
Duplex Mode for Cell 2	Config 1			FDD	
	Config 2			TDD	
TDD Configuration	Config 2			TDDConf.2.1	
OCNG Pattern Note 1				OP.1	As defined in A.3.2.1.
PDSCH parameters Note 3	Config 1			SR.1.1 FDD	As defined in A.3.1.1.
	Config 2			SR.2.1 TDD	
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-98	
		Config 2		-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-98	
		Config 2		-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2	Config 1		dBm	-65.3/9.36MHz	For symbols without SSB index 1
	Config 2			-62.2/38.16MHz	
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\text{CMAX, f, c}}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
MsgA Configuration				FR1 MsgA configuration 1	As defined in A.3.20.2.1.
msgA-RSRP-ThresholdSSB			dBm	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
Propagation Condition			-	AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.					

Note 2:	SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3:	The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.6.3.2.2.3.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble transmission shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.3.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB(s) contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.4 2-step RA type non-contention based test in FR1 for NR standalone

A.6.3.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.4.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.4.1-2.

Table A.6.3.2.2.4.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

Config	Description
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.6.3.2.2.4.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

Parameter			Unit	Test-1	Comments
SSB Configuration		Config 1		SSB pattern 2 in FR1	As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per SS-burst				2	Different from the definition in A.3.10
SS/PBCH block index				0,1	Different from the definition in A.3.10
Duplex Mode for Cell 1		Config 1		TDD	
TDD Configuration		Config 1		TDDConf.2.1	
OCNG Pattern Note 1				OP.1	As defined in A.3.2.1.
PDSCH parameters Note 4		Config 1		SR.2.1 TDD	As defined in A.3.1.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
msgA-*RSRP-ThresholdSSB*			dBm	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP Note 3		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured msgA-*RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP Note 3		dBm/ SCS	-115	
Io Note 2		Config 1	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\text{CMAX, f, c}}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
MsgA Configuration				FR1 MsgA configuration 2	As defined in A.3.20.2.2.
Propagation Condition			-	AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.					

Note 2:	SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3:	The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.6.3.2.2.4.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA PRACH on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB's contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access

Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.3 SA: RRC Connection Release with Redirection

A.6.3.2.3.1 Redirection from NR in FR1 to NR in FR1

A.6.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.6.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.1.2-2, and A.6.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	2.3	

Table A.6.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		2	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
SSB Configuration	Config 1		SSB.1 FR1			
	Config 2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
CSI-RS for tracking	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			
	Config 2		SR.1.1 TDD			
	Config 3		SR2.1 TDD			
CORESET Reference Channel	Config 1		CR.1.1 FDD			
	Config 2		CR.1.1 TDD			
	Config 3		CR2.1 TDD			
OCNG Patterns			OCNG pattern 1			
SMTC configuration	Config 1,2		SMTC.1 FR1			
	Config 3		SMTC.2 FR1			
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PRACH configuration			FR1 PRACH configuration 1			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			

N_{oc} Note2	Config 1,2	dBm/SCS	-98			
	Config 3		-95			
$\hat{E}_s/I_{ot}$		dB	4	4	-infinity	4
$\hat{E}_s/N_{oc}$		dB	4	4	-infinity	4
Io Note3	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59	-70.05	-64.59
	Config 3	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49
Propagation condition		-	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection\_release\_redirect\_NR} = T_{RRC\_procedure\_delay} + T_{identify\text{-}NR} + T_{SI\text{-}NR} + T_{RACH},$$

where:

$T_{RRC\_procedure\_delay}$ = 110 msin the test.

$T_{identify\text{-}NR}$ = 680 ms in the test.

$T_{SI\text{-}NR}$ = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

T_{RACH} = 170 ms in the test.

This gives a total of 2240 ms.

A.6.3.2.3.2 Redirection from NR in FR1 to E-UTRAN

A.6.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3.2.2.

A.6.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.2.2-2, A.6.3.2.3.2.2-3 and A.6.3.2.3.2.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.2.2-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.2.3.2.2-2: General test parameters for Redirection from NR to E-UTRAN test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	2.3	

Table A.6.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

Parameter		Unit	Cell 1	
			T1	T2
RF Channel Number			1	
Duplex mode	Config 1,4		FDD	
	Config 2,3,5,6		TDD	
SSB Configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
TDD configuration	Config 1,4		Not Applicable	
	Config 2,5		TDDConf.1.1	
	Config 3,6		TDDConf.2.1	
$BW_{channel}$	Config 1,4	MHz	10: $N_{RB,c}$ = 52	
	Config 2,5		10: $N_{RB,c}$ = 52	
	Config 3,6		40: $N_{RB,c}$ = 106	
BWP BW	Config 1,4	MHz	10: $N_{RB,c}$ = 52	
	Config 2,5		10: $N_{RB,c}$ = 52	
	Config 3,6		40: $N_{RB,c}$ = 106	
DRx Cycle		ms	Not Applicable	
PDSCH Reference measurement channel	Config 1,4		SR.1.1 FDD	
	Config 2,5		SR.1.1 TDD	
	Config 3,6		SR2.1 TDD	
CORESET Reference Channel	Config 1,4		CR.1.1 FDD	
	Config 2,5		CR.1.1 TDD	
	Config 3,6		CR2.1 TDD	
OCNG Patterns			OCNG pattern 1	
SMTC configuration	Config 1,2,4,5		SMTC.1 FR1	
	Config 3,6		SMTC.2 FR1	
PDSCH/PDCCH subcarrier spacing	Config 1,2,4,5	kHz	15 kHz	
	Config 3,6		30 kHz	
PUCCH/PUSCH subcarrier spacing	Config 1,2,4,5	kHz	15 kHz	
	Config 3,6		30 kHz	
PRACH configuration			FR1 PRACH configuration 1	
BWP configuration	Initial DL BWP		DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1	
	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2		dBm/15kHz	-98	

N_{oc} Note2	Config 1,2,4,5	dBm/SCS	-98	
	Config 3,6		-95	
$\hat{E}_s/I_{ot}$		dB	4	4
$\hat{E}_s/N_{oc}$		dB	4	4
Io Note3	Config 1,2,4,5	dBm/ 9.36MHz	-64.59	-64.59
	Config 3,6	dBm/ 38.16MHz	-58.49	-58.49
Propagation condition		-	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

Table A.6.3.2.3.2.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	2	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink configuration[Note1]		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PRACH Configuration[Note2]		1, 2, 3	4	
		4, 5, 6	53	
PDSCH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note3]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note4]				
OCNG_RB[Note4]				
N_{oc}[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	4
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2, 3, 4, 5, 6	-Infinity	4
RSRP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
SCH_RP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
Io[Note6]	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-64.76
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 5:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 6:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2.
The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection\_release\_redirect\_E\text{-}UTRA} = T_{RRC\_procedure\_delay} + T_{identify\text{-}E\text{-}UTRA} + T_{SI\text{-}E\text{-}UTRA} + T_{RACH},$$

where:

$T_{RRC\_procedure\_delay}$ = 110 ms in the test.

$T_{identify\text{-}E\text{-}UTRA}$ = 800 ms in the test.

$T_{SI\text{-}E\text{-}UTRA}$ = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

T_{RACH} = 15 ms in the test.

This gives a total of 2205 ms.

A.6.3.3 Conditional handover

A.6.3.3.1 Intra-frequency conditional handover from FR1 to FR1

A.6.3.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency conditional handover requirements specified in clause 6.1.4.2.

A.6.3.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.3.1.2-1. Both conditional handover delay and interruption length are tested by using the parameters in table A.6.3.3.1.2-2, and A.6.3.3.1.2-3.

The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall configure a condition implying handover to cell 2 during T1, at a time earlier than T_{RRC} before the beginning of T2.

Table A.6.3.3.1.2-1: Intra-frequency conditional handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.3.1.2-2: General test parameters Intra-frequency conditional handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset in condition		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
PRACH configuration index			FR1 PRACH configuration 1	As specified in table Table 6.3.3.2-3 in TS 38.211 [6]
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤2	

Table A.6.3.3.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency conditional handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		1	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			
	Config 2		SR.1.1 TDD			
	Config 3		SR2.1 TDD			
CORESET Reference Channel	Config 1		CR.1.1 FDD			
	Config 2		CR.1.1 TDD			
	Config 3		CR2.1 TDD			
TRS configuration	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
OCNG Patterns			OCNG pattern 1			
SMTC Configuration			SMTC pattern 1			
SSB Configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PRACH configuration			FR1 PRACH configuration 1			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			
N_{oc} Note2	Config 1,2	dBm/SCS	-98			
	Config 3		-95			

$\hat{E}_s/I_{ot}$		dB	8	-3.3	-Infinity	2.36
$\hat{E}_s/N_{oc}$		dB	8	8	-Infinity	11
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-Infinity	-87
	Config 3	dBm/SCS	-87	-87	-Infinity	-84
Io[Note3]	Config 1,2	dBm/ 9.36MHz	-61.41	-57.06	-61.41	-57.06
	Config 3	dBm/ 38.16MHz	-55.31	-50.96	-55.31	-50.96
Propagation condition		-	AWGN			AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.3.3.1.3 Test Requirements

$T_{RRC} + T_{Event\_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO\_execution}$ = 800 +62 +10=872ms from the start of T2 and the interruption during T2 shall not exceeed $T_{interrupt}$=$T_{processing} + T_{IU} + T_{\Delta} + T_{margin}$ =40+20+2 = 62ms

A.6.3.3.2 Inter-frequency conditional handover from FR1 to FR1

A.6.3.3.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR conditional FR1-NR FR1 inter frequency conditional handover requirements specified in clause 6.1.4.2.

A.6.3.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.3.2.2-1. Both conditional handover delay and interruption length are tested by using the parameters in table A.6.3.3.2.2-2, and A.6.3.3.2.2-3.

The test scenario comprises of two carriers and one cell on each carrier Gap pattern ID gp0 is configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying handover to cell 2 during T1, at a time earlier than T_{RRC} before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

Table A.6.3.3.2.2-1: Inter-frequency handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.3.3.2.2-2: General test parameters Inter-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset in handover condition		dB	-4	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
T1		s	5	
T2		s	≤2	

Table A.6.3.3.2.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		2	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
TRS configuration	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
DRx Cycle		ms	Not Applicable			
Gap pattern ID			gp0			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			
	Config 2		SR.1.1 TDD			
	Config 3		SR2.1 TDD			
CORESET Reference Channel	Config 1		CR.1.1 FDD			
	Config 2		CR.1.1 TDD			
	Config 3		CR2.1 TDD			
OCNG Patterns			OCNG pattern 1			
SMTC Configuration			SMTC pattern 1			
SSB Configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz			
	Config 3		30 kHz			
PRACH configuration			FR1 PRACH configuration 1			
BWP	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98		-98	

N_{oc} Note2	Config 1,2	dBm/SCS	-98		-98	
	Config 3		-95		-95	
$\hat{E}_s/I_{ot}$		dB	4	4	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	4	4	-Infinity	5
SSB_RP	Config 1,2	dBm/SCS	-94	-94	-Infinity	-93
	Config 3	dBm/SCS	-91	-91	-Infinity	-90
Io Note3	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59	-70.05	-63.85
	Config 3	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75
Propagation condition		-	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.3.3.2.3 Test Requirements

$T_{RRC} + T_{Event\_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO\_execution}$ =920 +62 +10=992 ms from the start of T2 and the interruption during T2 shall not exceeed $T_{interrupt}=T_{processing} + T_{IU} + T_{\Delta} + T_{margin}$ =40+20+2 = 62ms excluding any transmissions which do not occur due to measurement gaps.

Inter-frequency CHO FR1-FR1 920 (Tmeasure)+62 (Tinterrupt)+10 (TCHO_execution) = 992 62 m

A.6.4 Timing

A.6.4.1 UE transmit timing

A.6.4.1.1 NR UE Transmit Timing Test for FR1

A.6.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table A.6.4.1.1.1-1.

Table A.6.4.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to be tested in one of the supported test configurations	

For this test a single NR cell is used. Table A.6.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.6.4.1.1.1-3.

Table A.6.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1,2,3	1	1
TDD configuration		1	Not Applicable	
		2	TDDConf.1.1	
		3	TDDConf.2.1	
$BW_{channel}$	MHz	1	10: $N_{RB,c}$ = 52	
		2	10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106	
Initial BWP Configuration		1,2,3	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1,2,3	DLBWP.1.1 ULBWP.1.1	
DRx Cycle	ms	1,2,3	N/A	DRX.8 Note5
PDSCH Reference measurement channel		1	SR.1.1 FDD	
		2	SR.1.1 TDD	
		3	SR.2.1 TDD	
RMSI CORESET Reference Channel		1	CR.1.1 FDD	
		2	CR.1.1 TDD	
		3	CR.2.1 TDD	
Dedicated CORESET Reference Channel		1	CCR.1.1 FDD	
		2	CCR.1.1 TDD	
		3	CCR.2.1 TDD	
OCNG Patterns		1,2,3	OP.1	
SSB configuration		1,2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC Configuration		1,2	SMTC.1	
		3	SMTC.2	
TRS configuration		1	TRS.1.1 FDD	
		2	TRS.1.1 TDD	
		3	TRS.1.2 TDD	
EPRE ratio of PSS to SSS	dB	1,2,3	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15 kHz	1,2,3	-98	-98
N_{oc} Note2	dBm/SCS	1,2	-98	-98
		3	-95	-95
$\hat{E}_s/I_{ot}$		1,2,3	3	3

$\hat{E}_s/N_{oc}$		1,2,3	3	3
SS-RSRP[Note3]	dBm/SCS	1,2	-95	-95
		3	-92	-92
Io[Note3]	dBm/9.36MHz	1,2	-65.2	-65.2
	dBm/38.1MHz	3	-59.2	-59.2
Propagation condition		1,2,3	AWGN	
SRS Config		1,2	SRSConf.1[Note6]	SRSConf.3[Note6]
		3	SRSConf.1[Note6]	SRSConf.2[Note6]
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: DRx related parameters are given in Table A.3.3.8-1 Note 6: SRS configs are given in Table A.6.4.1.1.1-3				

Table A.6.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	0	
	srs-ResourceIdList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-Resource	SRS-ResourceId	0	0	0	
	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	14 for test configuration 1,2 25 for test configuration 3	25	14	Matches $N_{RB,c}$
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 0	sl320, 0	Offset to align with DRx periodicity
	sequenceId	0	0	0	Any 10 bit number

Table A.6.4.1.1.1-4: Void

A.6.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

1) Setup NR PCell according to parameters given in Table A.6.4.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.

   a. The N_{TA} offset value (in T_c units) is 25600

   b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.6.4.1.1.2-1

Table A.6.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjustment Value	
	Test1	Test2
15	+64*64T_c	+32*64T_c
30	+32*64T_c	+16*64T_c

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (N_{TA} + N_{TA_offset}) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within (N_{TA} + N_{TA_offset}) ×T_c ± T_e of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.6.4.2 UE timer accuracy

A.6.4.3 Timing advance

A.6.4.3.1 SA FR1 timing advance adjustment accuracy

A.6.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.6.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.6.4.3.1.2-2, A.6.4.3.1.2-3 and A.6.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.6.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.6.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.6.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T_A) value during T1		31	$N_{TA\_new} = N_{TA\_old}$ for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T_A) value during T2		39	For 15 kHz SCS $N_{TA\_new} = N_{TA\_old} + 8192*T_c$ For 30 kHz SCS $N_{TA\_new} = N_{TA\_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	s	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter		Unit	Test1 T1	Test1 T2
Duplex mode	Config 1		FDD	
	Config 2,3		TDD	
TDD configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52	
	Config 2		10: $N_{RB,c}$ = 52	
	Config 3		40: $N_{RB,c}$ = 106	
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52	
	Config 2		10: $N_{RB,c}$ = 52	
	Config 3		40: $N_{RB,c}$ = 106	
DRx Cycle		ms	Not Applicable	
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	
	Config 2		SR.1.1 TDD	
	Config 3		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	
	Config 2		CR.1.1 TDD	
	Config 3		CR2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	
	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
TRS configuration	Config 1,4		TRS.1.1 FDD	
	Config 2,5		TRS.1.1 TDD	
	Config 3,6		TRS.1.2 TDD	
OCNG Patterns			OCNG pattern 1	
SMTC configuration	Config 1,2		SMTC.1 FR1	
	Config 3		SMTC.2 FR1	
SSB configuration	Config 1,2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz	
	Config 3		30 kHz	
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz	
	Config 3		30 kHz	
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2		dBm/15kHz	-98	
N_{oc} Note2	Config 1,2	dBm/SCS	-98	
	Config 3		-95	
$\hat{E}_s/I_{ot}$		dB	3	

$\hat{E}_s/N_{oc}$		dB	3
Io[Note3]	Config 1,2	dBm/ 9.36MHz	-67.57
	Config 3	dBm/ 38.16MHz	-62.58
Propagation condition		-	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.6.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment
c-SRS	Config 1,2	12	Frequency hopping is disabled
	Config 3	24	
b-SRS		0	
b-hop		0	
freqDomainPosition		0	Frequency domain position of SRS
freqDomainShift		0	
groupOrSequenceHopping		neither	No group or sequence hopping
SRS-PeriodicityAndOffset		sl5=2 for SCS 15kHz sl5=4 for SCS 30kHz	Once every 5 slots
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage		Codebook	Codebook based UL transmission
startPosition		0	resourceMapping setting. SRS on last symbol of slot, and 1symbols for SRS without repetition.
nrofSymbols		n1	
repetitionFactor		n1	
combOffset-n2		0	transmissionComb setting
cyclicShift-n2		0	
nrofSRS-Ports		port1	Number of antenna ports used for SRS transmission
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.6.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.6.5 Signalling characteristics

A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52
	Config 2		10: $N_{RB,c}$ = 52
	Config 3		40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1
	Config 3		Table A.3.8.2.1-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			*OFF*

Gap pattern ID			*gp0*
Layer 3 filtering			*Enabled*
T310 timer		ms	*0*
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
T1		s	0.2
T2		s	0.48
T3		s	0.48
D1		s	0.44
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS		dB	4		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0		
EPRE ratio of PBCH DMRS to SSS		dB	0		
EPRE ratio of PBCH to PBCH DMRS		dB			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
N_{oc}	Config 1	dBm/15kHz	-98		
	Config 2		-98		
	Config 3		-98		
N_{oc}	Config 1	dBm/SCS	-98		
	Config 2		-98		
	Config 3		-95		
Propagation condition			TDL-C 300ns 100Hz		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.1.1-1.
Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
	Value
gapOffset	0

Note: Ensure that RLM RS is partially overlapped with measurement gap

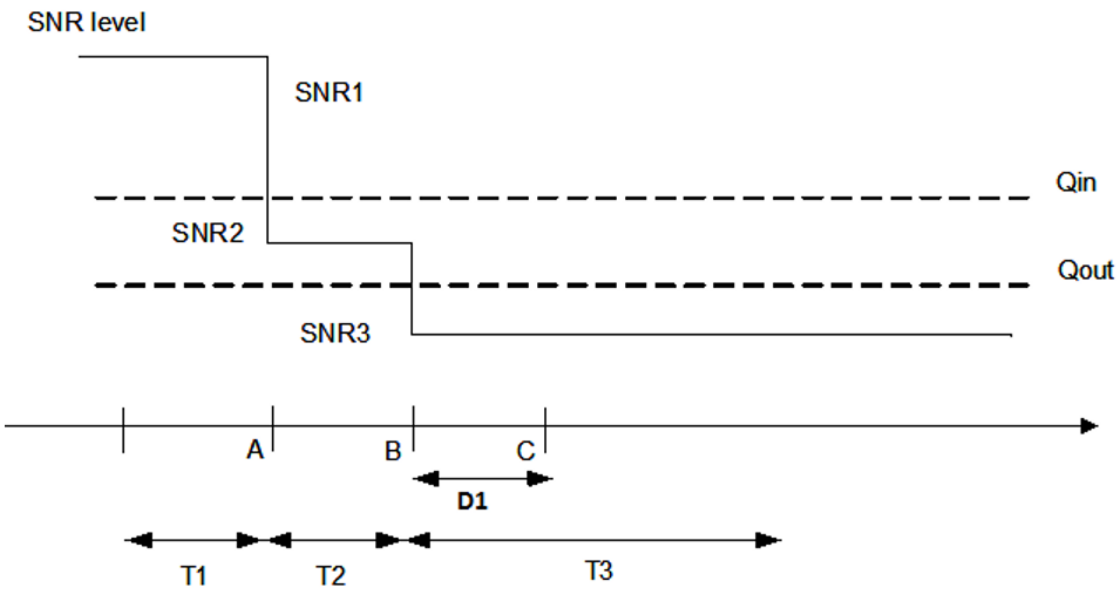

Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

A.6.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.6.5.1.2.1-1. The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52
	Config 2		10: $N_{RB,c}$ = 52
	Config 3		40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1
	Config 3		Table A.3.8.2.1-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6

Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			*OFF*
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		s	0.2
T2		s	0.2
T3		s	0.24
T4		s	0.2
T5		s	0.88
D1		s	0.84
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB	0				
EPRE ratio of PBCH DMRS to SSS		dB	0				
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/ 15 kHz	-98				
	Config 2		-98				
	Config 3		-98				
N_{oc}	Config 1	dBm/ SCS	-98				
	Config 2		-98				
	Config 3		-95				
Propagation condition			TDL-C 300ns 100Hz				
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1. Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.							

Table A.6.5.1.2.1-4: Void

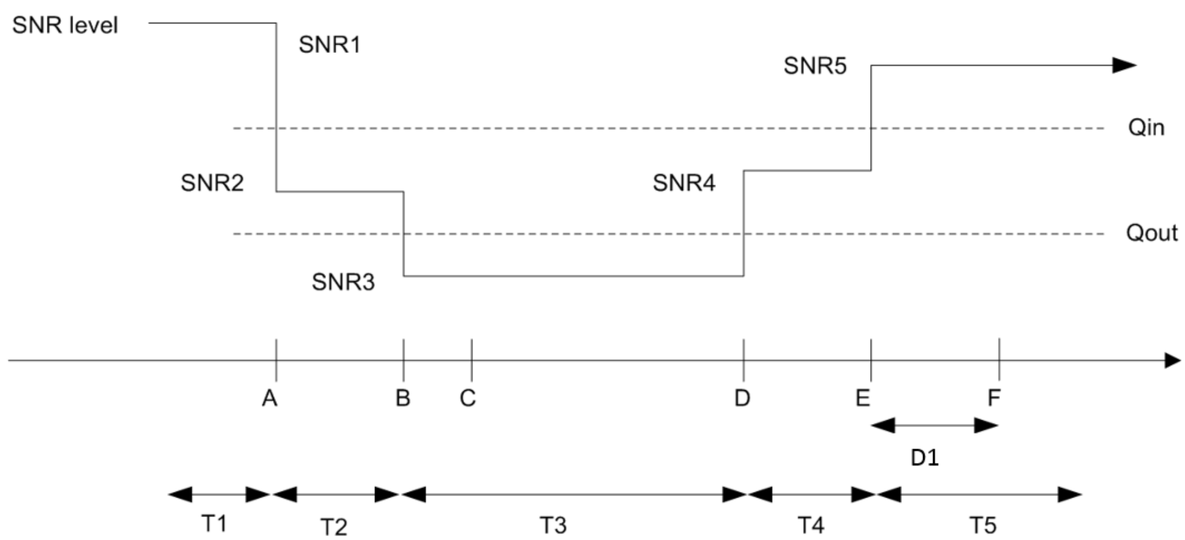

Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

A.6.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.6.5.1.3.1-1. The test parameters are given in Tables A.6.5.1.3.1-2, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52
	Config 2		10: $N_{RB,c}$ = 52
	Config 3		40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1
	Config 3		Table A.3.8.2.1-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	*0*
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
T1		s	0.2
T2		s	0.68
T3		s	0.68
D1		s	0.64
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS		dB	4		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0		
EPRE ratio of PBCH DMRS to SSS		dB	0		
EPRE ratio of PBCH to PBCH DMRS		dB			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
N_{oc}	Config 1	dBm/15 kHz	-98		
	Config 2		-98		
	Config 3		-98		
N_{oc}	Config 1	dBm/SCS	-98		
	Config 2		-98		
	Config 3		-95		
Propagation condition			TDL-C 300ns 100Hz		
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1. Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.					

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

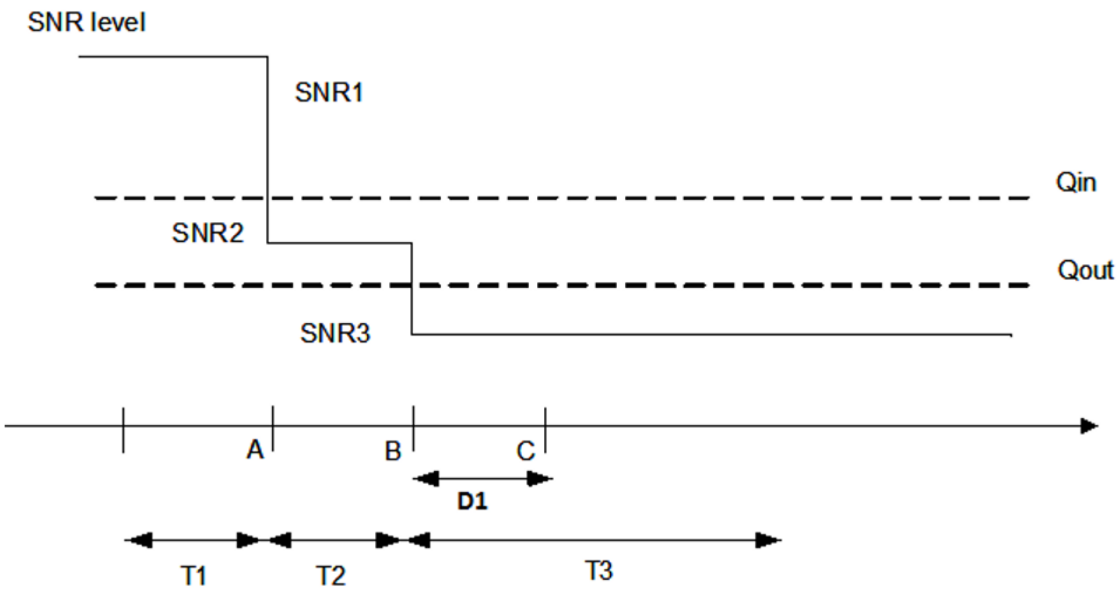

Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

A.6.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52
	Config 2		10: $N_{RB,c}$ = 52
	Config 3		40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1
	Config 3		Table A.3.8.2.1-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH	dB	4

	DMRS energy to average SSS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
T1		s	0.2
T2		s	0.2
T3		s	0.64
T4		s	0.2
T5		s	0.88
D1		s	0.84
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB	0				
EPRE ratio of PBCH DMRS to SSS		dB	0				
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15 kHz	-98				
	Config 2		-98				
	Config 3		-98				
N_{oc}	Config 1	dBm/SCS	-98				
	Config 2		-98				
	Config 3		-95				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.4.1-1.
Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.6.5.1.4.1-4: Void

Table A.6.5.1.4.1-5: Void

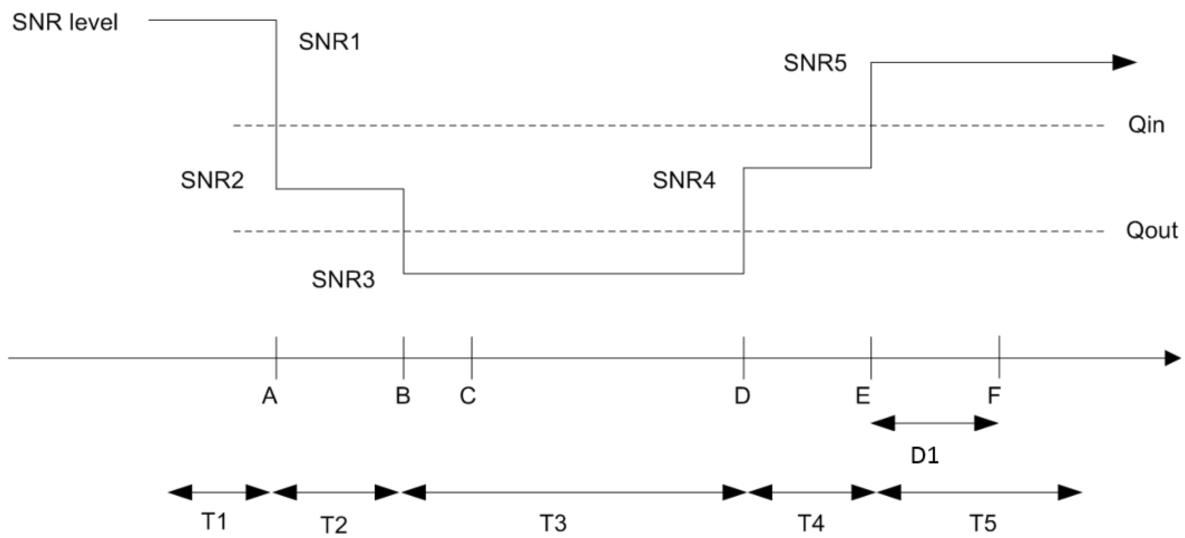

Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

A.6.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.5.1-1, A.6.5.1.5.1-2, A.6.5.1.5.1-3, and A.6.5.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.5.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State. 2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			*OFF*
Gap pattern ID			*gp0*

Layer 3 filtering			*Enabled*
T310 timer		ms	*0*
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		s	0.2
T2		s	0.48
T3		s	0.48
D1		s	0.44
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4		
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB			
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0		
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB			
EPRE ratio of PSS to SSSSSS_beta		dB			
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
N_{oc}	Config 1	dBm/15kHz	-98		
	Config 2		-98		
	Config 3		-98		
Propagation condition			TDL-C 300ns 100Hz		
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1. Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1. Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].					

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1
	Value
gapOffset	0
Note 1: Void	

Table A.6.5.1.5.1-4: Void

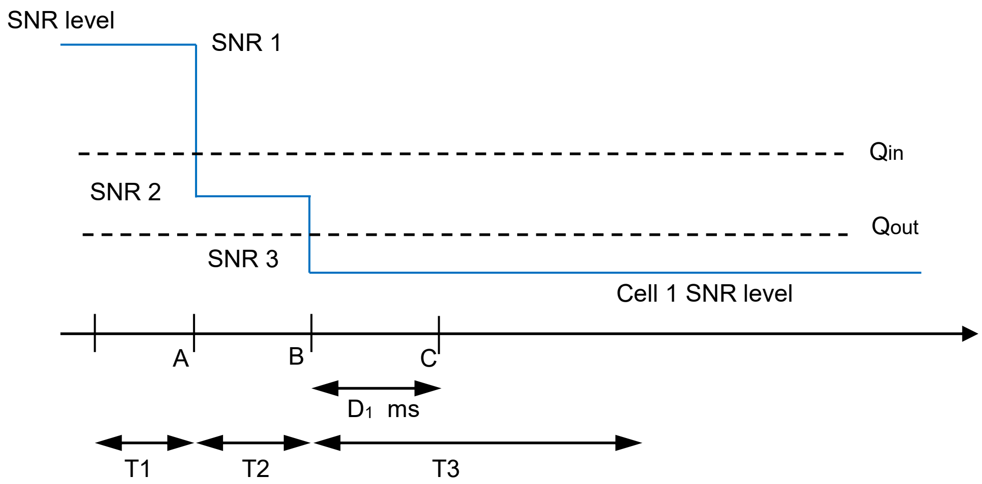

Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.6.1-1, A.6.5.1.6.1-2, and A.6.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State. 2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission parameters	DCI format		1-0

	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			*OFF*
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		s	0.2
T2		s	0.2
T3		s	0.44
T4		s	0.2
T5		s	0.88
T6		S	0.84
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4				
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB					
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0				
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB					
EPRE ratio of PSS to SSSSSS_beta		dB					
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15kHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.6.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1.

Table A.6.5.1.6.1-4: Void

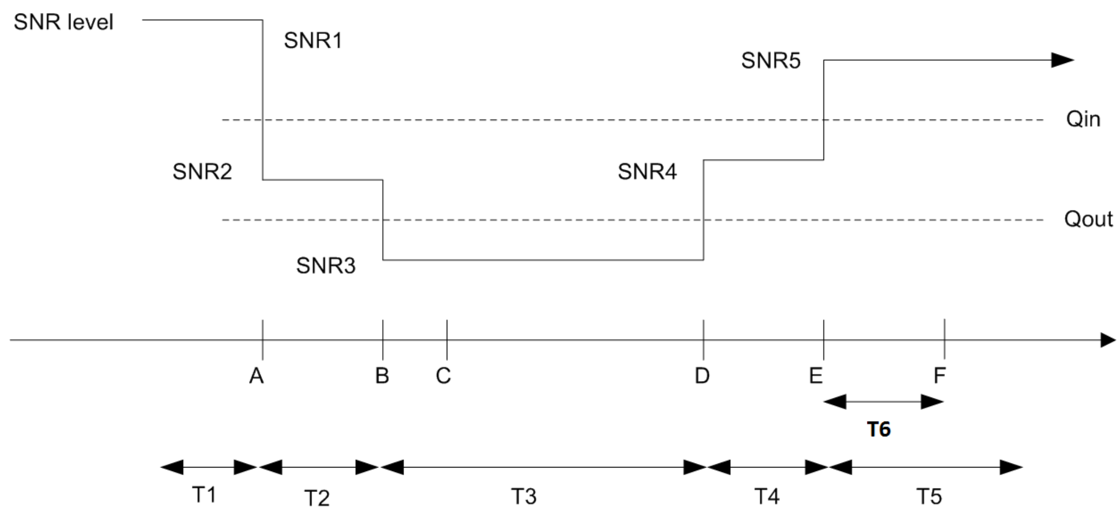

Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.7 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.7.1-1, A.6.5.1.7.1-2, and A.6.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State. 2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000

N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		s	0.2
T2		s	1.28
T3		s	1.28
D1		s	1.24
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4		
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB	4		
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0		
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB			
EPRE ratio of PSS to SSSSSS_beta		dB			
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
N_{oc}	Config 1	dBm/15kHz	-98		
	Config 2		-98		
	Config 3		-98		
Propagation condition			TDL-C 300ns 100Hz		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1.

Table A.6.5.1.7.1-4: Void

Table A.6.5.1.7.1-5: Void

Table A.6.5.1.7.1-6: Void

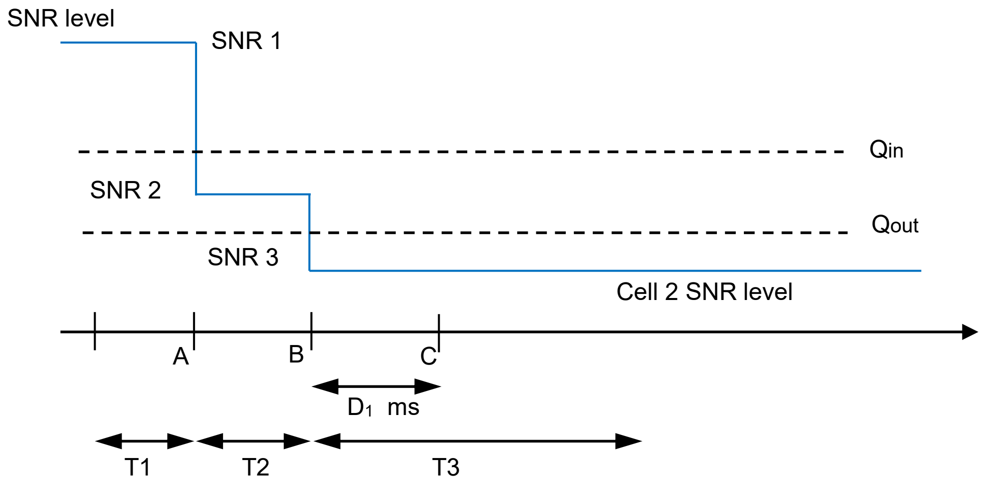

Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.8.1-1, A.6.5.1.81-2, A.6.5.1.8.1-3 and A.6.5.1.8.1-3A below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.1.8.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State. 2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission parameters	DCI format		1-0

	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		s	0.2
T2		s	0.2
T3		s	1.24
T4		s	0.2
T5		s	1.88
T6		s	1.84
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4				
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB					
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0				
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB					
EPRE ratio of PSS to SSSSSS_beta		dB					
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15kHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.8.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.1.1.

Table A.6.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Test 1
	Value
gapOffset	0
Note 1: Void	

Table A.6.5.1.8.1-4: Void

Table A.6.5.1.8.1-5: Void

Table A.6.5.1.8.1-6: Void

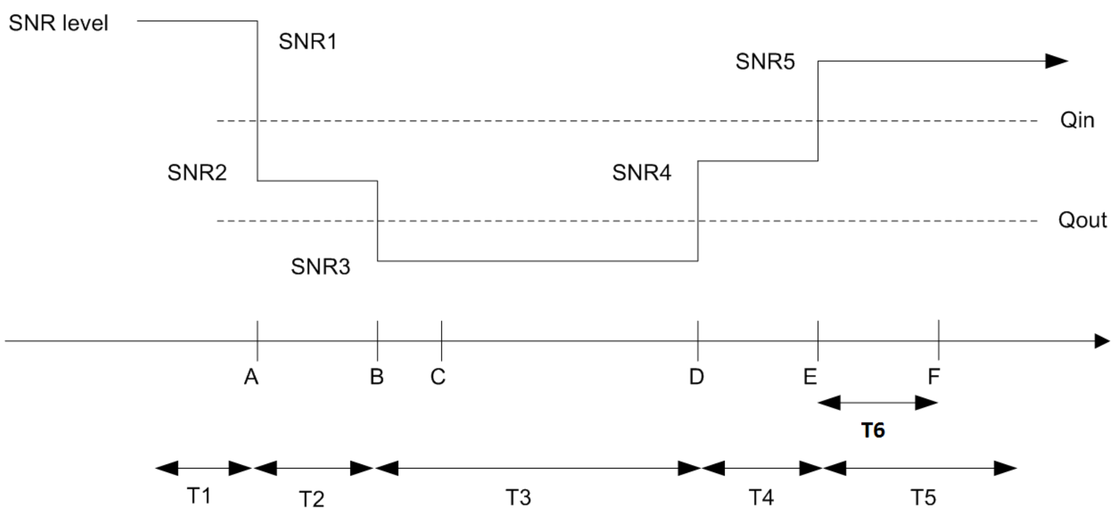

Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.2 Interruption

A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

A.6.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.6.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2 and A 6.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, PCell is continuously scheduled in DL.

Table A.6.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD – FDD duplex mode
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD – TDD duplex mode
3	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD – FDD duplex mode
4	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD – TDD duplex mode
5	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD – TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth ($BW_{channel}$) defined in each test configuration,	

Table A.6.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	s	10	

Table A.6.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Config 3		TDD	FDD
	Config 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Config 4		Not Applicable	TDDConf.1.1
	Config 5		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	Config 1,2,3,4		Note 9	Note 9
	Config 5		Note 9	Note 9
$BW_{occupied}$	Config 1,2,3,4	RB	52 Note 7	52 Note 7
	Config 5		106 Note 8	106 Note 8
Initial DL BWP Configuration	Config 1,2,3,4		DLBWP.0.1	DLBWP.0.1
	Config 5		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP Configuration	Config 1,2,3,4		DLBWP.1.1	DLBWP.1.1
	Config 5		DLBWP.1.1	DLBWP.1.1
Initial UL BWP Configuration	Config 1,2,3,4		ULBWP.0.1	
	Config 5		ULBWP.0.1	
Dedicated UL BWP Configuration	Config 1,2,3,4		ULBWP.1.1	
	Config 5		ULBWP.1.1	
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.1.1 FDD
	Config 2		SR.1.2 TDD	SR.1.2 TDD
	Config 3		SR.1.2 TDD	SR.1.1 FDD
	Config 4		SR.1.1 FDD	SR.1.2 TDD
	Config 5		SR.2.1 TDD	SR.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD	TRS.1.1 FDD
	Config 2		TRS.1.1 TDD	TRS.1.1 TDD
	Config 3		TRS.1.1 TDD	TRS.1.1 FDD
	Config 4		TRS.1.1 FDD	TRS.1.1 TDD
	Config 5		TRS.1.2 TDD	TRS.1.2 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.1.1 FDD
	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Config 4		CR.1.1 FDD	CR.1.1 TDD
	Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD
	Config 4		CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns	Config 1,2,3,4		OP.1 Note 7	OP.1 Note 7
	Config 5		OP.1 Note 8	OP.1 Note 8
SMTC Configuration			SMTC.1	SMTC.4
SSB Configuration	Config 1,2,3,4		SSB.1 FR1	SSB.5 FR1
	Config 5		SSB.2 FR1	SSB.6 FR1

Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2		dBm/15 kHz	-104	-104
SS-RSRP Note 3		dBm/15 kHz	-87	-87
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
N_{oc} Note 2	Config 1,2,3,4	dBm/SCS	-104	-104
	Config 5		-101	-101
Io Note3	Config 1,2,3,4	dBm/ 9.36MHz	-58.96	-58.96
	Config 5	dBm/ 38.16MHz	-52.86	-52.86
Time offset to Cell1 Note 5		µs	-	3
Propagation Condition			AWGN	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled within $BW_{occupied}$. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess. Note 4: Void Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of TS 38.213 [3]. Note 7: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 10 MHz, 52 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured. Note 8: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 40 MHz, 106 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured. Note 9: $N_{RB,c}$. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured $BW_{channel}$.				

A.6.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-2.

Table A.6.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.6.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.2.2 SA interruptions at NR SRS carrier based switching

A.6.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit aperiodic SRS, the UE can perform carrier based switching to one carrier not configured for PUCCH/PUSCH transmission from a carrier with PUCCH/PUSCH transmission. The test will partly verify the interruption requirements on PCell in clause 8.2.2.2.9.

A.6.5.2.2.2 Test Parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the FR1 PCell and Cell 2 is activated SCell on the TDD SCC which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell.The test parameters for PCell and SCell are given in Table A.6.5.2.2.2-2 and A.6.5.2.2.2-3 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. Immediately at the beginning of T2, the UE is triggered for SRS switching.

The test equipment verifies that potential interruption is carried out correctly by monitoring ACK/NACK sent in PCell.

Table A.6.5.2.2.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD – TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.5.2.2.2-2: General test parameters for SA interruptions at NR SRS carrier based switching

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1
Configured SCell		Cell 2	Activated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	5	
T2	ms	40	UE shall perform SRS switching during T2

Table A.6.5.2.2.2-3: Cell specific test parameters for SA interruptions at NR SRS carrier based switching

Parameter		Unit	T1		T2	
			Cell 1	Cell 2	Cell 1	Cell 2
Duplex mode	Config 1		FDD	TDD	FDD	TDD
	Config 2,3		TDD			
TDD configuration	Config 1		N/A	TDDConf.1.1	N/A	TDDConf.1.1
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
Downlink initial BWP Configuration			DLBWP.0.1			
Downlink dedicated BWP Configuration			DLBWP.1.1			
Uplink initial BWP configuration			ULBWP.0.1			
Uplink dedicated BWP configuration			ULBWP.1.1			
TCI state			TCI.State.0			
TRS Configuration			TRS.1.1 TDD			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.1.1 TDD	SR.1.1 FDD	SR.1.1 TDD
	Config 2		SR.1.1 TDD	SR.1.1 TDD	SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR2.1 TDD	SR2.1 TDD	SR2.1 TDD	SR2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD	CCR.1.1 TDD	CCR.1.1 FDD	CCR.1.1 TDD
	Config 2		CCR.1.1 TDD	CCR.1.1 TDD	CCR.1.1 TDD	CCR.1.1 TDD

	Config 3		CCR.2.1 TDD	CCR.2.1 TDD	CCR.2.1 TDD	CCR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.1.1 TDD	CR.1.1 FDD	CR.1.1 TDD
	Config 2		CR.1.1 TDD	CR.1.1 TDD	CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR2.1 TDD	CR2.1 TDD	CR2.1 TDD	CR2.1 TDD
OCNG Patterns			OP.1			
SRS Configuration	Config 1,2		SRS.1 TDD			
	Config 3		SRS.2 TDD			
SSB Configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
SMTC configuration			SMTC.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	Config 1,2,4,5	dBm/15kHz	-104			
	Config 3,6		-101			
$\hat{E}_s/I_{ot}$		dB	17			
$\hat{E}_s/N_{oc}$		dB	17			
SS-RSRP Note3	Config 1,2,4,5	dBm/SCS	-87			
	Config 3,6		-84			
SCH_RP Note 3		dBm/15 kHz	-87			
Propagation condition		-	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Table A.6.5.2.2.2-4: Void

A.6.5.2.2.3 Test Requirements

The UE shall be scheduled on PCell continuously throughout the test. During the time duration T2, the interruption on PCell shall not be more than the values specified for SA in clause 8.2.2.2.9.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.3 SCell Activation and Deactivation Delay

A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $\mathrm{n} + \frac{T_{\mathrm{HARQ}}+T_{\mathrm{activation\_time}}+T_{\mathrm{CSI\_Reporting}}}{\mathrm{NR\ slot\ length}}$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $n + \frac{T_{\mathrm{HARQ}}+3\mathrm{ms}}{\mathrm{NR\ slot\ length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $n + 1 + \frac{T_{\mathrm{HARQ}}}{\mathrm{NR\ slot\ length}}$ to $n + 1 + \frac{T_{\mathrm{HARQ}}+3\mathrm{ms}+T_{\mathrm{X}}}{\mathrm{NR\ slot\ length}} + N_{\mathrm{interruption}}$, as defined in clause 8.3, where $N_{\mathrm{interruption}}$ is the interruption length given in clause 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $\mathrm{m} + \frac{\mathrm{T_{HARQ}}+3ms}{NR\ slot\ length}$, as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot $\mathrm{m} + 1 + \frac{\mathrm{T_{HARQ}}}{NR\ slot\ length}$ to $\mathrm{m} + 1 + \frac{\mathrm{T_{HARQ}+3ms}}{NR\ slot\ length}$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth ($BW_{channel}$) defined in each test configuration,	

Table A.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
T3	s	1	During this time the UE shall deactivate the SCell.
T_{HARQ}	ms	k_1×NR slot length	k_1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
$T_{CSI\_Reporting}$	ms	15	the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]

Table A.6.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit	Cell 1			Cell 2		
			T1	T2			T1	T2
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1,2	MHz	Note 7					
	Config 3		Note 7					
$BW_{occupied}$	Config 1,2	RB	52 Note 5					
	Config 3		106 Note 6					
Initial BWP configuration			DLBWP.0.2					
TCI state			TCI.State.0					
TRS Configuration	Config 1		TRS.1.1 FDD					
	Config 2		TRS.1.1 TDD					
	Config 3		TRS.1.2 TDD					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			-		
	Config 2		SR.1.1 TDD			-		
	Config 3		SR.2.1 TDD			-		
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD			-		
	Config 2		CCR.1.1 TDD			-		
	Config 3		CCR.2.1 TDD			-		
RMSI CORESET parameters	Config 1		CR.1.1 FDD			-		
	Config 2		CR.1.1 TDD			-		
	Config 3		CR.2.1 TDD			-		
OCNG Patterns	Config 1,2		OP.1 Note 5					
	Config 3,		OP.1 Note 6					
SSB Configuration	Config 1,2		SSB.1 FR1					
	Config 3		SSB.2 FR1					
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD					
	Config 2		CSI-RS.1.1 TDD					
	Config 3		CSI-RS.2.1 TDD					

SMTC configuration			SMTC.1	
reportConfigType			periodic	
reportQuantity			cri-RI-PMI-CQI	
CSI reporting periodicity	Config 1,2	slot	5	N/A
	Config 3		10	N/A
CSI reporting offset	Config 1,2	slot	2	N/A
	Config 3		4	N/A
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	Config 1,2	dBm/SCS	-104	
	Config 3		-101	
$\hat{E}_s/I_{ot}$		dB	17	
$\hat{E}_s/N_{oc}$		dB	17	
SS-RSRP Note3	Config 1,2	dBm/SCS	-87	
	Config 3		-84	
SCH_RP Note 3		dBm/15 kHz	-87	
Io Note3	Config 1,2	dBm/ 9.36MHz	-58.96	
	Config 3	dBm/ 38.16MHz	-52.87	
Propagation condition		-	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within $BW_{occupied}$. Note 3: SS-RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. Note 5: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 10 MHz, 52 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured. Note 6: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 40 MHz, 106 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured. Note 7: $N_{RB,c}$. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured $BW_{channel}$.				

A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot $(n + 1 + \frac{T_{HARQ}+3ms}{NR\ slot\ length})$. UE is allowed to postpone CSI report to next available uplink resource if an available uplink resource is subject to interruption.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot $n + \frac{T_{HARQ}+T_{activtion\_time}+T_{CSI\_Reporting}}{NR\ slot\ length}$, $T_{activation\_time} = T_{FirstSSB}$+ 5ms, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot $\mathrm{m}+\frac{\mathrm{T_{HARQ}+3ms}}{NR\ slot\ length}$, as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $n+1+\frac{T_{\mathrm{HARQ}}}{\mathrm{NR\ slot\ length}}$ to $n+1+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}+T_{\mathrm{X}}}{\mathrm{NR\ slot\ length}}+N_{\mathrm{interruption}}$, as defined in clause 8.3.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $\mathrm{m}+1+\frac{\mathrm{T_{HARQ}}}{NR\ slot\ length}$ to $\mathrm{m}+1+\frac{\mathrm{T_{HARQ}+3ms}}{NR\ slot\ length}$, as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot $\frac{\mathrm{T_{HARQ}}+T_{\mathrm{activtion\_time}}+T_{\mathrm{CSI\_Reporting}}}{NR\ slot\ length}$ as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.6.5.3.2 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 320ms SCell measurement cycle

A.6.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1. The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.6.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.6.5.3.2.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{\mathrm{activation\_time}}$ will be replaced with the value $T_{\mathrm{FirstSSB\_MAX}} + T_{\mathrm{rs}} + 5\mathrm{ms}$.

A.6.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

A.6.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $\mathrm{n}+\frac{T_{\mathrm{HARQ}}+T_{\mathrm{activation\_time}}+T_{\mathrm{CSI\_Reporting}}}{\mathrm{NR\ slot\ length}}$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $n+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}}{\mathrm{NR\ slot\ length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $n+1+\frac{T_{\mathrm{HARQ}}}{\mathrm{NR\ slot\ length}}$ to $n+1+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}+T_{\mathrm{X}}}{\mathrm{NR\ slot\ length}}+N_{\mathrm{interruption}}$, as defined in clause 8.3, where $N_{\mathrm{interruption}}$ is the interruption length given in clause 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $\mathrm{m}+\frac{\mathrm{T_{HARQ}}+3ms}{NR\ slot\ length}$, as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot $\mathrm{m}+1+\frac{\mathrm{T_{HARQ}}}{NR\ slot\ length}$ to $\mathrm{m}+1+\frac{\mathrm{T_{HARQ}}+3\mathrm{ms}}{NR\ slot\ length}$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.6.5.3.3.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{\mathrm{activation\_time}}$ will be replaced with the value $T_{\mathrm{FirstSSB\_MAX}} + T_{\mathrm{SMTC\_MAX}} + 2^*T_{\mathrm{rs}}$ + 5ms as defined in clause 8.3.

A.6.5.3.4 Direct SCell activation at SCell addition of known SCell in FR1

A.6.5.3.4.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of direct SCell activation delay and interruption requirements at SCell addition as defined in clause 8.3.4 and 8.2.2, respectively. The supported test configurations are shown in Table A.6.5.3.4.1-1.

The test scenario comprises one PCell (Cell 1) and one SCell (Cell 2) as outlined in Table A.6.5.3.4.1-2. Cell-specific parameters are provided in Table A.6.5.3.4.1-3.

The test consists of two successive time periods with duration T1 and T2, respectively. There are two carriers, each with one cell. Cell 1 (PCell) is on RF channel 1 (PCC), and Cell 2 (SCell) is on RF channel 2 (SCC). Cell 1 and Cell 2 both operate according to one of the configurations in Table A.6.5.3.4.1-1.

Before the test starts the UE is connected to Cell 1 on RF channel 1. The UE is only monitoring RF channel 1 and is not aware of Cell 2 on RF channel 2.

The UE is continuously scheduled in PCell throughout the test.

At the beginning of T1 the UE is configured to measure RF channel 2 in measurement gaps. During T1, the UE detects and measures Cell 2 on RF channel 2, and sends a measurement report containing Cell 2 to the test equipment. After having received a measurement report containing Cell 2, the test equipment deconfigures the measurement gaps and thereafter sends a RRC connection reconfiguration message to the UE by which it configures the SCell (Cell 2) in activated state (*sCellState* is set to *activated*). The time between reception of the last measurement report carrying SCell and transmission of the RRC connection reconfiguration message directly activating SCell is kept short enough to allow the SCell to remain known to the UE.

Time period T2 starts when the UE receives the RRC connection reconfiguration message at the UE antenna connector. The corresponding slot at which the message is received at the UE antenna connector is denoted *n*. The UE shall complete activation of the SCell no later than in slot $n + \frac{\mathrm{N_{direct}}}{\mathrm{NR\ slot\ length}}$, as specified in clause 8.3.4. From slot $n + \frac{\mathrm{N_{direct}}}{\mathrm{NR\ slot\ length}}$ and onwards the UE shall report valid CSI both for PCell and SCell.

The test equipment verifies the activation time by counting the slots between the RRC connection reconfiguration message is sent and until CSI report with non-zero CQI for both PCell and SCell is received.

The test equipment verifies that interruptions on other serving cells are within the requirements by counting ACK/NACKs transmitted in PCell.

Table A.6.5.3.4.1-1: Supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.3.4.1-2: General test parameters

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Inter-frequency neighbor cell (SCell to-be)		Cell 2	Inter-frequency neighbor cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Measurement gap pattern		gp0	Measurement gap is used during parts of time period T1 for detection of Cell 2.
CSI reporting periodicity	ms	2	CSI reporting periodicity for periodic reporting of CQI for PCell and, when added, SCell.
SCell measurement cycle (measCycleSCell)	ms	160	Measurement cycle for SCell does not come into effect in direct activation at SCell addition.
Timing offset between Cell 1 and Cell 2	μs	≤ MRTD	The value of maximum timing offset depends upon the carrier aggregation scenario.
T1	s	7	During this time period the PCell shall be known and Cell 2 shall be detected as an inter-frequency neighbor cell.
T2	s	1	During this time period Cell 2 shall be configured and directly activated as SCell.

Table A.6.5.3.4.1-3: NR Cell specific test parameters

Parameter		Unit	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL		DLBWP.0.1		---	DLBWP.0.1
	Initial UL		ULBWP.0.1			---
	Dedicated DL		DLBWP.1.1			DLBWP.1.1
	Dedicated UL		ULBWP.1.1			---
TCI state			TCI.State.0		---	TCI.State.0
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD		---	CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD			CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD			CSI-RS.2.1 TDD
TRS Configuration	Config 1		TRS.1.1 FDD		---	TRS.1.1 FDD
	Config 2		TRS.1.1 TDD			TRS.1.1 TDD
	Config 3		TRS.1.2 TDD			TRS.1.2 TDD
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD		---	SR.1.1 FDD
	Config 2		SR.1.1 TDD			SR.1.1 TDD
	Config 3		SR.2.1 TDD			SR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD		---	CCR.1.1 FDD
	Config 2		CCR.1.1 TDD			CCR.1.1 TDD
	Config 3		CCR.2.1 TDD			CCR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD		---	
	Config 2		CR.1.1 TDD			
	Config 3		CR.2.1 TDD			
OCNG Pattern			OP.1		OP.1	
SSB Configuration	Config 1,2		SSB.1 FR1		SSB.1 FR1	
	Config 3		SSB.2 FR1		SSB.2 FR1	
SMTC configuration			SMTC.1		SMTC.1	
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS Note1						
EPRE ratio of OCNG to OCNG DMRS Note1						
N_{oc} Note2	Config 1,2	dBm/15kHz	-104		-104	
	Config 3		-101		-101	
$\hat{E}_s/I_{ot}$		dB	17		17	
$\hat{E}_s/N_{oc}$		dB	17		17	
SS-RSRP Note3	Config 1,2	dBm/SCS	-87		-87	
	Config 3		-84		-84	
Io Note3	Config 1,2	dBm/9.36 MHz	-59.0		-59.0	
	Config 3	dBm/38.16 MHz	-52.9		-52.9	
Propagation condition			AWGN		AWGN	
Correlation Matrix and Antenna Configuration			1x2 Low		1x2 Low	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.						

Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP, SCH_RP, and Io levels have been derived from other parameters for information purpose. They are not settable parameters themselves.

A.6.5.3.4.2 Test Requirements

The UE shall complete the direct activation of the SCell no later than at slot $n + \frac{\mathrm{N_{direct}}}{\mathrm{NR\ slot\ length}}$.

The UE shall report non-zero CQI for SCell from slot $n + \frac{\mathrm{N_{direct}}}{\mathrm{NR\ slot\ length}}$ and onwards throughout time period T2.

The interruption on PCell during direct activation of the SCell shall occur within the interruption window specified in clause 8.3.4 and shall not exceed the length specified in clause 8.2.2.2.11.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.3.5 Direct SCell activation at handover with known SCell in FR1

A.6.5.3.5.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD and TDD-TDD intra frequency handover with direct SCell activation requirements specified in subclause 8.3.5.

Supported test configurations are shown in table A.6.5.3.5.1-1. Both handover with direct SCell activation requirements are tested by using the parameters in table A.6.5.3.5.1-2, and A.6.5.3.5.1-3.

The test scenario comprises of three NR FDD or NR TDD FR1 carriers and the 3 cells as given in tables A.6.5.3.5.1-1 and A.6.5.3.5.1-2. The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command to Cell 3 that also activates SCell1 (Cell2). This is done using an *RRCReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted n at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (n + N_{direct}).

Time period T3 starts at (n + N_{direct}), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

Table A.6.5.3.5.1-1: Intra-frequency handover with direct SCell activation from FR1 to FR1 test configurations

Config	Description
1	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode SCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode SCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	PCell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode SCell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.3.5.1-2: General test parameters Intra-frequency handover with direct SCell activation from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	PCell		Cell 1	
	SCell		Cell 2	
	Target cell		Cell 3	
Final condition	PCell		Cell 3	
	SCell		Cell 2	
	neighbour cell		Cell 1	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
PRACH configuration index			FR1 PRACH configuration 1	As specified in table Table 6.3.3.2-3 in TS 38.211 [6]
Time offset between cells			3 μs	Synchronous cells
T1		s	5	UE is in connected mode with PCell and SCell1 (cell 2) is in activated state. UE receives a handover command
T2		s	N_{direct}	UE shall accomplish the activation of the SCell
T3		s	1	
T_{HARQ}		slot	k	k is a number of slots indicated by the PDSCH-to-HARQ_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3]
$T_{CSI\_Reporting}$		ms	2	the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]
k		ms	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe},\mu} + 1$	As specified in clause 4.3 of TS 38.213 [3]

Table A.6.5.3.5.1-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover with direct SCell activation test case

Parameter		Unit	Cell 1			Cell 2			Cell 3		
			T1	T2	T3	T1	T2	T3	T1	T2	T3
NR RF Channel Number			1			2			1		
Duplex mode	Config 1		FDD								
	Config 2,3		TDD								
TDD configuration	Config 1		Not Applicable								
	Config 2		TDDConf.1.1								
	Config 3		TDDConf.2.1								
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52								
	Config 2		10: $N_{RB,c}$ = 52								
	Config 3		40: $N_{RB,c}$ = 106								
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52								
	Config 2		10: $N_{RB,c}$ = 52								
	Config 3		40: $N_{RB,c}$ = 106								
DRx Cycle		ms	Not Applicable								
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD								
	Config 2		SR.1.1 TDD								
	Config 3		SR2.1 TDD								
CORESET Reference Channel	Config 1		CR.1.1 FDD								
	Config 2		CR.1.1 TDD								
	Config 3		CR2.1 TDD								
TRS configuration	Config 1		TRS.1.1 FDD								
	Config 2		TRS.1.1 TDD								
	Config 3		TRS.1.2 TDD								
OCNG Patterns			OCNG pattern 1								
SMTC Configuration			SMTC pattern 1								
SSB Configuration	Config 1,2		SSB.1 FR1								
	Config 3		SSB.2 FR1								
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz								
	Config 3		30 kHz								
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz								
	Config 3		30 kHz								
PRACH configuration			FR1 PRACH configuration 1								
BWP configuraiton	Initial DL BWP		DLBWP.0.1								
	Dedicated DL BWP		DLBWP.1.1								
	Initial UL BWP		ULBWP.0.1								
	Dedicated UL BWP		ULBWP.1.1								
EPRE ratio of PSS to SSS		dB	0								
EPRE ratio of PBCH DMRS to SSS											
EPRE ratio of PBCH to PBCH DMRS											
EPRE ratio of PDCCH DMRS to SSS											
EPRE ratio of PDCCH to											

PDCCH DMRS											
EPRE ratio of PDSCH DMRS to SSS											
EPRE ratio of PDSCH to PDSCH											
EPRE ratio of OCNG DMRS to SSS(Note 1)											
EPRE ratio of OCNG to OCNG DMRS (Note 1)											
N_{oc} Note2		dBm/15 kHz	-98								
N_{oc} Note2	Config 1,2	dBm/SCS	-98								
	Config 3		-95								
$\hat{E}_s/I_{ot}$		dB	8	8	8	8	8	8	8	8	8
$\hat{E}_s/N_{oc}$		dB	8	8	8	8	8	8	8	8	8
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	-90	-90	-90	-90	-90	-90
	Config 3	dBm/SCS	-87	-87	-87	-87	-87	-87	-87	-87	-87
Io Note3	Config 1,2	dBm/9.36MHz	-61.41	-57.06	-57.06	-61.41	-57.06	-61.41	-57.06	-57.06	-61.41
	Config 3	dBm/38.16MHz	-55.31	-50.96	-50.96	-55.31	-50.96	-55.31	-50.96	-50.96	-55.31
Propagation condition		-	AWGN			AWGN			AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.											

A.6.5.3.5.2 Test Requirements

The UE shall be capable to transmit valid CSI report for the directly activated SCell1 no later than in subframe n+N_{direct}.

The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

NOTE: The SCell activation delay, N_{direct}, can be expressed as: $N_{direct} = T_{RRC\_process} + T_{interrupt} + T_2 + T_3 + T_{activation\_time} + T_{CSI\_Reporting}$ - 3ms, where:

$T_{RRC\_Process}$: RRC procedure delay defined in clause 12 of TS 38.331 [2],

$T_{interrupt}$: Interruption time during handover as specified in clause 6.1.1,

T_2: Delay from slot $n + \frac{T_{RRC\_Process}+T_{interrupt}}{\text{NR slot length}}$ until UE has obtained a valid TA command for the target PCell,

T_3: Delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213,

$T_{activation\_time}$ and $T_{CSI\_Reporting}$ are specified in clause 8.3.2, where the following definitions of $T_{FirstSSB}$ and $T_{FirstSSB\_MAX}$ as defined in section 8.3.5 shall apply:

- $T_{FirstSSB}$: the time to the end of the first complete SSB burst indicated by the SMTC after slot n + $(T_{RRC\_Process}+T_{interrupt}+T2+T3)/(NR\ slot\ length)$

- $T_{FirstSSB\_MAX}$: the time to the end of the first complete SSB burst indicated by the SMTC after slot n + $(T_{RRCProcess}+T_{interrupt}+T2+T3)/(NR\ slot\ length)$

This gives a total of $N_{direct} = 10 + 52 + T_{IU} + T_2 + T_3 + T_{activation\_time} + T_{CSI\_Reporting} - 3$ ms = 62 + 10 + 13 + 6 + 20 + 2 - 3 = 94 ms for test configurations 1 and 2.

This gives a total of $N_{direct} = 10 + 52 + T_{IU} + T_2 + T_3 + T_{activation\_time} + T_{CSI\_Reporting} - 3$ ms = 62 + 10 + 13 + 6 + 20 + 2 - 3 = 94 ms for test configuration 3.

During T3 the UE shall send valid CSI reports for PCell and SCell1 with non-zero CQI index and continue to send CSI reports for PCell and SCell1 (Cell 2) with non-zero CQI index until the end of T3.

All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct.

A.6.5.4 UE UL carrier RRC reconfiguration Delay

A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.6.5.4.1-1 - Table A.6.5.4.1-4 : Void

A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB.* The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A.6.5.4.1.1-2, Table A.6.5.4.1.1-3 and Table A.6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE. At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

Configuration	PCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
9	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth ($BW_{channel}$) defined in each test configuration,		

Table A.6.5.4.1.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1,2,3, 4, 5, 6, 7, 8, 9	1, 2	Two radio channels are used for these two tests.
Active cell		Config 1,2,3, 4, 5, 6, 7, 8, 9	Cell 1: FR1 PCell Cell 2: FR1 SCell	PCell on RF channel number 1 FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4, 5, 6, 7, 8, 9	Normal	
DRX		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Measurement gap pattern Id		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Filter coefficient		Config 1,2,3, 4, 5, 6, 7, 8, 9	0	L3 filtering is not used
T1	s	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T2	s	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T3	s	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

Parameter	Unit	Test Configuration	Test 1			Test 2		
			T1	T2	T3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1			1		
TDD configuration		Conf 1, 2, 3	N/A			N/A		
		Conf 4, 5, 6	TDD Conf.1.1			TDD Conf.1.1		
		Conf 7, 8, 9	TDD Conf.2.1			TDD Conf.2.1		
$BW_{channel}$	MHz	Conf 1, 2, 3	Note 6			Note 6		
		Conf 4, 5, 6	Note 6			Note 6		
		Conf 7, 8, 9	Note 6			Note 6		
$BW_{occupied}$	RB	Conf 1, 2, 3	52 Note 4			52 Note 4		
		Conf 4, 5, 6	52 Note 4			52 Note 4		
		Conf 7, 8, 9	106 Note 5			106 Note 5		
PDSCH reference measurement channel as defined in A.3.1.1		Conf 1, 2, 3	SR.1.1 FDD			SR.1.1 FDD		
		Conf 4, 5, 6	SR.1.1 TDD			SR.1.1 TDD		
		Conf 7, 8, 9	SR 2.1 TDD			SR 2.1 TDD		
RMSI CORESET reference measurement channel as defined in A.3.1.2		Conf 1, 2, 3	CR.1.1 FDD			CR.1.1 FDD		
		Conf 4, 5, 6	CR.1.1 TDD			CR.1.1 TDD		
		Conf 7, 8, 9	CR.2.1 TDD			CR.2.1 TDD		
RMC CORESET reference measurement channel as defined in A.3.1.3		Conf 1, 2, 3	CCR.1.1 FDD			CCR.1.1 FDD		
		Conf 4, 5, 6	CCR.1.1 TDD			CCR.1.1 TDD		
		Conf 7, 8, 9	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6	OP.1 Note 4			OP.1 Note 4		
		Config 7, 8, 9	OP.1 Note 5			OP.1 Note 5		
SSB configuration		Conf 1, 2, 3, 4, 5, 6	SSB.1 FR1			SSB.1 FR1		
		Conf 7, 8, 9	SSB.2 FR1			SSB.2 FR1		
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	SMTC.1			SMTC.1		
CSI-RS for tracking		Conf 1	TRS.1.1 FDD			TRS.1.1 FDD		
		Conf 2	TRS.1.1 FDD			TRS.1.1 FDD		
		Conf 3	TRS.1.1 FDD			TRS.1.1 FDD		
		Conf 4	TRS.1.1 TDD			TRS.1.1 TDD		
		Conf 5	TRS.1.1 TDD			TRS.1.1 TDD		
		Conf 6	TRS.1.1 TDD			TRS.1.1 TDD		
		Conf 7	TRS.1.2 TDD			TRS.1.2 TDD		
		Conf 8	TRS.1.2 TDD			TRS.1.2 TDD		
		Conf 9	TRS.1.2 TDD			TRS.1.2 TDD		
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1			DLBWP.0.1		
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1			DLBWP.1.1		

UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1			ULBWP.1.1		
EPRE ratio of PSS to SSS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0			0		
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH to PBCH_DMRS								
EPRE ratio of PDCCH_DMRS to SSS								
EPRE ratio of PDCCH to PDCCH_DMRS								
EPRE ratio of PDSCH_DMRS to SSS								
EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSS								
EPRE ratio of OCNG to OCNG DMRS								
N_{oc} Note 2	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	-102			-102		
	dBm/ SCS	Conf 1,2,3,4,5,6	-102			-102		
		Conf 7,8,9	-99			-99		
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_s/I_{ot}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/ SCS	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86
		Conf 7,8,9	-83	-83	-83	-83	-83	-83
Io Note 3	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	dBm/ 38.16 MHz	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	AWGN			AWGN		
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2			1 x 2		

NOTE 1:	OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within $BW_{occupied}$.
NOTE 3:	$\hat{E}_s/I_{ot}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4:	All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 10 MHz, 52 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured.
NOTE 5:	All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 40 MHz, 106 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured.
NOTE 6:	$N_{RB,c}$. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured $BW_{channel}$.

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter	Unit	Test Configuration	Test 1			Test 2		
			T1	T2	T3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	2			2		
TDD configuration		Conf 1, 4, 7	N/A			N/A		
		Conf 2, 5, 8	TDDConf.1.1			TDDConf.1.1		
		Conf 3, 6, 9	TDDConf.2.1			TDDConf.2.1		
$BW_{channel}$	MHz	Conf 1, 4, 7	Note 6			Note 6		
		Conf 2, 5, 8	Note 6			Note 6		
		Conf 3, 6, 9	Note 6			Note 6		
$BW_{occupied}$	RB	Conf 1, 4, 7	52 Note 4			52 Note 4		
		Conf 2, 5, 8	52 Note 4			52 Note 4		
		Conf 3, 6, 9	106 Note 5			106 Note 5		
PUSCH parameters for NR UL carrier		Conf 1, 4, 7	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]	N/A	G-FR1-A3-10 in [13]	N/A
		Conf 2, 5, 8	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]	N/A	G-FR1-A3-10 in [13]	N/A
		Conf 3, 6, 9	G-FR1-A3-14 in [13]	G-FR1-A3-14 in [13]	G-FR1-A3-14 in [13]	N/A	G-FR1-A3-14 in [13]	N/A
PUCCH parameters For NR UL carrier		Conf 1, 4, 7	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]	N/A	N/A	N/A
		Conf 2, 5, 8	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]	N/A	N/A	N/A
		Conf 3, 6, 9	Table 8.3.3.1.2-2 in [13]	Table 8.3.3.1.2-2 in [13]	Table 8.3.3.1.2-2 in [13]	N/A	N/A	N/A
PUSCH parameters for supplementary UL		Conf 1, 4, 7	N/A	G-FR1-A3-10 in [13]	N/A	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]
		Conf 2, 5, 8	N/A	G-FR1-A3-10 in [13]	N/A	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]	G-FR1-A3-10 in [13]
		Conf 3, 6, 9	N/A	G-FR1-A3-14 in [13]	N/A	G-FR1-A3-14 in [13]	G-FR1-A3-14 in [13]	G-FR1-A3-14 in [13]
PUCCH parameters for supplementary UL		Conf 1, 4, 7	N/A	N/A	N/A	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]
		Conf 2, 5, 8	N/A	N/A	N/A	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]	Table 8.3.3.1.2-1 in [13]

		Conf 3, 6, 9	N/A	N/A	N/A	Table 8.3.3.1.2-2 in [13]	Table 8.3.3.1.2-2 in [13]	Table 8.3.3.1.2-2 in [13]
PDSCH reference measurement channel as defined in A.3.1.1		Conf 1, 4, 7	SR.1.1 FDD			SR.1.1 FDD		
		Conf 2, 5, 8	SR.1.1 TDD			SR.1.1 TDD		
		Conf 3, 6, 9	SR 2.1 TDD			SR 2.1 TDD		
RMSI CORESET reference measurement channel as defined in A.3.1.2		Conf 1, 4, 7	CR.1.1 FDD			CR.1.1 FDD		
		Conf 2, 5, 8	CR.1.1 TDD			CR.1.1 TDD		
		Conf 3, 6, 9	CR.2.1 TDD			CR.2.1 TDD		
RMC CORESET reference measurement channel as defined in A.3.1.3		Conf 1, 4, 7	CCR.1.1 FDD			CCR.1.1 FDD		
		Conf 2, 5, 8	CCR.1.1 TDD			CCR.1.1 TDD		
		Conf 3, 6, 9	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern [Note 1]		Conf 1, 2, 4, 5, 7, 8	OP.1 [Note 4]			OP.1 [Note 4]		
		Conf 3, 6, 9	OP.1 [Note 5]			OP.1 [Note 5]		
SSB configuration		Conf 1, 2, 4, 5, 7,8	SSB.1 FR1			SSB.1 FR1		
		Conf 3, 6, 9	SSB.2 FR1			SSB.2 FR1		
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	SMTC.1			SMTC.1		
CSI-RS for tracking		Conf 1	TRS.1.1 FDD			TRS.1.1 FDD		
		Conf 2	TRS.1.1 TDD			TRS.1.1 TDD		
		Conf 3	TRS.1.2 TDD			TRS.1.2 TDD		
		Conf 4	TRS.1.1 FDD			TRS.1.1 FDD		
		Conf 5	TRS.1.1 TDD			TRS.1.1 TDD		
		Conf 6	TRS.1.2 TDD			TRS.1.2 TDD		
		Conf 7	TRS.1.1 FDD			TRS.1.1 FDD		
		Conf 8	TRS.1.1 TDD			TRS.1.1 TDD		
		Conf 9	TRS.1.2 TDD			TRS.1.2 TDD		
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1			DLBWP.0.1		
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1			DLBWP.1.1		
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1			ULBWP.1.1		
EPRE ratio of PSS to SSS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0			0		
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH to PBCH_DMRS								
EPRE ratio of PDCCH_DMRS to SSS								
EPRE ratio of PDCCH to PDCCH_DMRS								

EPRE ratio of PDSCH_DMRS to SSS								
EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSS								
EPRE ratio of OCNG to OCNG DMRS								
N_{oc} Note 2	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	-102			-102		
	dBm/ SCS	Conf 1, 2, 4, 5, 7,8	-102			-102		
		Conf 3, 6, 9	-99			-99		
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_s/I_{ot}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/ SCS	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
		Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
Io Note 3	dBm/ 9.36 MHz	Conf 1, 2, 4, 5, 7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	dBm/ 38.16 MHz	Conf 3, 6, 9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	AWGN			AWGN		
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2			1 x 2		

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within $BW_{occupied}$.
NOTE 3: $\hat{E}_s/I_{ot}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 10 MHz, 52 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured.
NOTE 5: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 40 MHz, 106 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured.
NOTE 6: $N_{RB,c}$. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured $BW_{channel}$.

A.6.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.6.5.4.2 Void

A.6.5.5 Beam Failure Detection and Link recovery procedures

A.6.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

A.6.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.1.1-1, A.6.5.5.1.1-2, A.6.5.5.1.1-3 and A.6.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.6.5.5.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PSCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
BWchannel	Config 1	MHz	10: NRB,c = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET Reference Channel	Config 1		CR.1.1 FDD	
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 KHz	
	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.2-1	
	Config 3		Table A.3.8.2.2-1	
SSB Index assigned as BFD RS (q_0)			0	
SSB Index assigned as CBD RS (q_1)			1	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS	dB	0	

	RE energy			
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	
Gap pattern ID			gp0	
gapOffset			0	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/SCS kHz	-98	Threshold used for $Q_{in\_LR\_SSB}$
	Config 3		-95	
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD	
	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
SSB Index assigned as RLM RS			0, 1	
T310 Timer		ms	1000	
N310			2	
T1		s	0.2	During this time the the UE shall be fully synchronized to cell 1
T2		s	0.37	
T3		s	0.24	
T4		s	0	
T5		s	0.17	
D1		s	0.13	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.6.5.5.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of set q_1	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-108	-108	-88	-88	-88
	Config 2		-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.1.1-4: Void

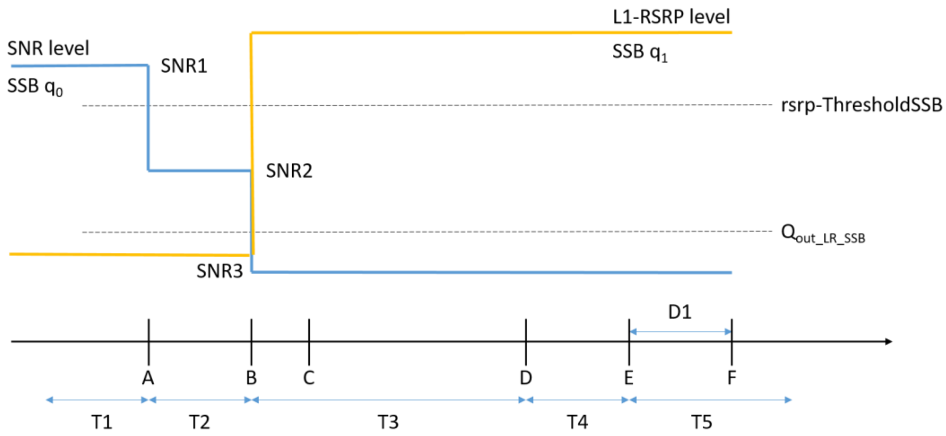

Figure A.6.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

A.6.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.2.1-1, A.6.5.5.2.1-2, A.6.5.5.2.1-3, A.6.5.5.2.1-4 and A.6.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PSCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
BWchannel	Config 1	MHz	10: NRB,c = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET Reference Channel	Config 1		CR.1.1 FDD	
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 KHz	
	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.2-1	
	Config 3		Table A.3.8.2.2-1	
SSB Index assigned as BFD RS (q_0)			0	
SSB Index assigned as CBD RS (q_1)			1	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	

	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
rlmInSyncOutOfSyncThreshold			Absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/ SCS kHz	-98	Threshold used for $Q_{in\_LR\_SSB}$
	Config 3		-95	
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD	
	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
SSB Index assigned as RLM RS			0, 1	
T310 Timer		ms	1000	
N310			2	

T1	s	1	During this time the the UE shall be fully synchronized to cell 1
T2	s	5.17	
T3	s	3.24	
T4	s	0	
T5	s	1.97	
D1	s	1.93	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.5.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of set q_1	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-108	-108	-88	-88	-88
	Config 2		-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagation condition			TDL-C 300ns 100Hz				
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1. Note 4: Void Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1. Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.							

Table A.6.5.5.2.1-4: Void

Table A.6.5.5.2.1-5: Void

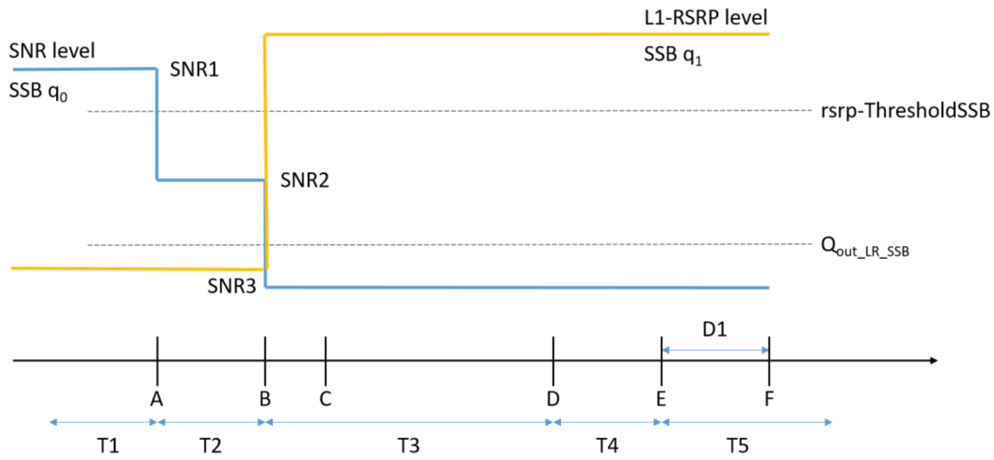

Figure A.6.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.3 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.6.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.3.1-1, A.6.5.5.3.1-2, and below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET Reference Channel	Config 1		CR.1.1 FDD	A.3.1.2
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	A.3.10
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SSB Configuration	Config 1		SSB. 3 FR1	A.3.10
	Config 2		SSB. 3 FR1	
	Config 3		SSB. 4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	A.3.11
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 KHz	
	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		FR1 PRACH configuration 4	A.3.8.2
	Config 3		FR1 PRACH configuration 4	A.3.8.2
csi-RS-Index assigned as beam failure detection RS in set q_0			0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	

DRX			OFF	
Gap pattern ID			N.A.	
csi-RS-Index assigned as candidate beam detection RS in set q_1			1	N
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/SCS kHz	-98	Threshold used for $Q_{in\_LR\_SSB}$
	Config 3		-95	
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0 and q_1	Config 1		CSI-RS.1.2 FDD	A.3.14
	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD	A.3.14
	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned as RLM RS	Config 1		CSI-RS.1.2 FDD	A.3.14
	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		s	0.2	During this time the the UE shall be fully synchronized to cell 1
T2		s	0.18	
T3		s	0.14	
T4		s	0	
T5		s	0.08	
D1		s	0.04	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.6.5.5.3.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q_0	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set q_1	Config 1	dBm/SCS kHz	-108	-108	-88	-88	-88
	Config 2		-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.3.1-4: Void

Table A.6.5.5.3.1-5: Void

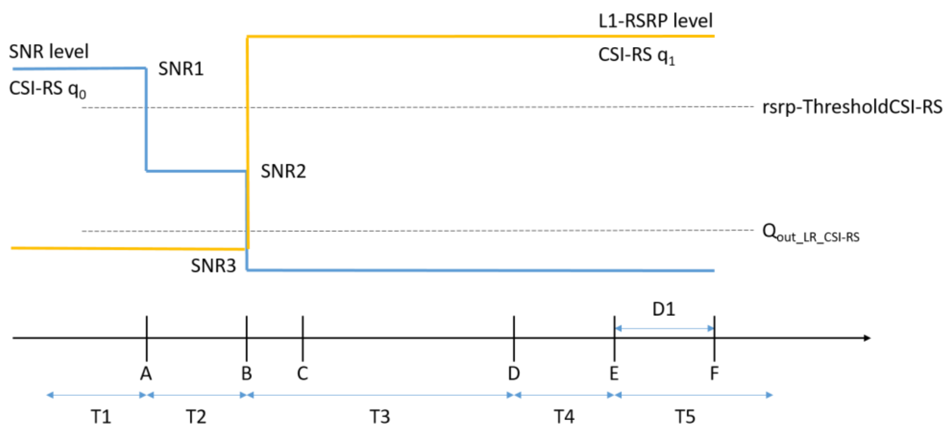

Figure A.6.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.4 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.6.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.4.1-1, A.6.5.5.4.1-2, A.6.5.5.4.1-3, and A.6.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.6.5.5.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.5.4.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf..21	
CORESET Reference Channel	Config 1		CR.1.1 FDD	A.3.1.2
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB. 3 FR1	A.3.10
	Config 2		SSB. 3 FR1	
	Config 3		SSB. 4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	A.3.11
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 KHz	
	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		FR1 PRACH configuration 4	A.3.8.2
	Config 3		FR1 PRACH configuration 4	A.3.8.2
csi-RS-Index assigned as beam failure detection RS in set q_0			0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
csi-RS-Index assigned as candidate			1	

beam detection RS in set q_1				
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/SCS kHz	-98	Threshold used for $Q_{in\_LR\_SSB}$
	Config 3		-95	
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0 and q_1	Config 1		CSI-RS.1.2 FDD	A.3.14.1
	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD	A.3.14.1
	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned as RLM RS	Config 1		CSI-RS.1.2 FDD	
	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	8.37	
T3		s	6.44	
T4		s	0	
T5		s	1.97	
D1		s	1.93	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.6.5.5.4.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q_0	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set q_1	Config 1	dB/SCS kHz	-110	-110	-88	-88	-88
	Config 2		-110	-110	-88	-88	-88
	Config 3		-107	-107	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.4.1-4: Void

Table A.6.5.5.4.1-5: Void

Table A.6.5.5.4.1-6: Void

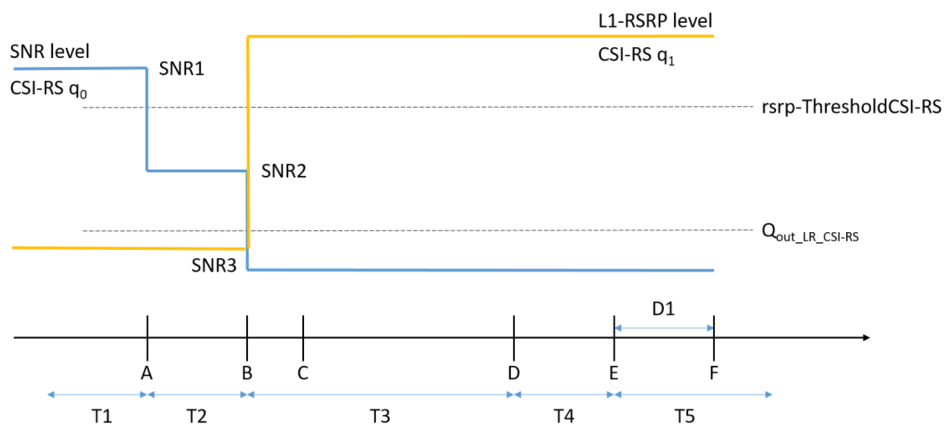

Figure A.6.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.6.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.5 Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in non-DRX mode

A.6.5.5.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candicate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.5.1-1, A.6.5.5.5.1-2, and below. There are two cells, cell 1 is the PCell and cell 2 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.5.1-1 shows the SNR of the CSI-RS in set q_0 in the active SCell to emulate beam failure. Figure A.6.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled.

Table A.6.5.5.5.1-1: Supported test configurations for FR1 PCell and SCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.5.5.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value Test 1	Comment
Active PCell			Cell 1	
RF Channel Number			1	
Active SCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET Reference Channel	Config 1		CR.1.1 FDD	A.3.1.2
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	A.3.10
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	A.3.11
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 KHz	
	Config 3		30 KHz	
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.1-1	
	Config 3, 6		Table A.3.8.2.1-1	
csi-RS-Index assigned as beam failure detection RS in set q_0 in activated SCell			0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS	dB	0	

	RE energy				
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy		dB	0	
	DMRS precoder granularity			REG bundle size	
	REG bundle size			6	
DRX				OFF	
Gap pattern ID				N.A.	
schedulingRequestID-BFR-SCell-r16				absent	When the field is absent, the random access procedure will be triggered for SCell BFR
SSB Index assigned as CBD RS (q1) in activated SCell				0	
rlmInSyncOutOfSyncThreshold				absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2		dBm/SCS kHz	-98	Threshold used for $Q_{in\_LR\_SSB}$
	Config 3			-95	
powerControlOffsetSS				db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount				n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer				pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0		Config 1		CSI-RS.1.2 FDD	A.3.14
		Config 2		CSI-RS.1.2 TDD	
		Config 3		CSI-RS.2.2 TDD	
CSI-RS configuration for CSI reporting		Config 1		CSI-RS.1.1 FDD	A.3.14
		Config 2		CSI-RS.1.1 TDD	
		Config 3		CSI-RS.2.1 TDD	
TRS configuration		Config 1		TRS.1.1 FDD	
		Config 2		TRS.1.1 TDD	
		Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned as RLM RS		Config 1		CSI-RS.1.2 FDD	A.3.14
		Config 2		CSI-RS.1.2 TDD	
		Config 3		CSI-RS.2.2 TDD	

T310 Timer	ms	1000	
N310		2	
T1	s	0.2	During this time the the UE shall be fully synchronized to cell 1
T2	s	0.18	
T3	s	0.14	
T4	s	0	
T5	s	0.17	
D1	s	0.13	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.5.5.1-3: Cell specific test parameters for FR1 SCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Cell1	Test 1 Cell2				
			T1 to T5	T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB	0	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB						
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_CSI-RS of set q_0	Config 1	dB	5	5	-3	-12	-12	-12
	Config 2		5	5	-3	-12	-12	-12
	Config 3		5	5	-3	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	-10	-10	-10	10	10	10
	Config 2		-10	-10	-10	10	10	10
	Config 3		-10	-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/ SCS kHz	-108	-108	-108	-88	-88	-88
	Config 2		-108	-108	-108	-88	-88	-88
	Config 3		-105	-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/ 15kHz	-98	-98				
	Config 2		-98	-98				
	Config 3		-98	-98				

Propagation condition		TDL-C 300ns 100Hz	TDL-C 300ns 100Hz
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1. Note 4: Void Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS. Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1. Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.			

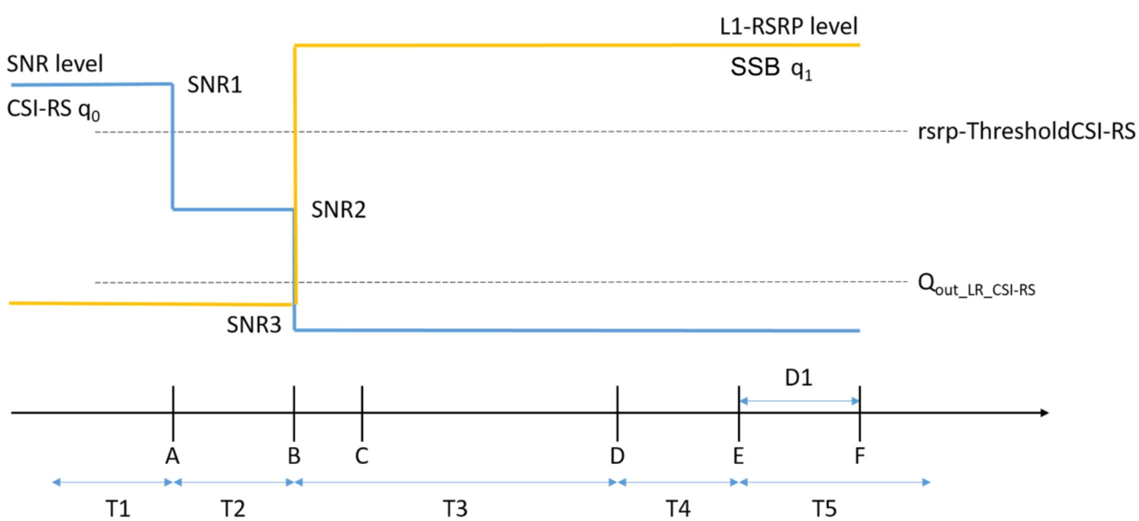

Figure A.6.5.5.5.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing in for SCell non-DRX mode

A.6.5.5.5.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing a beam associated with the candidate beam set q_1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.6 Beam Failure Detection and Link Recovery Test for FR1 SCell configured with CSI-RS-based BFD and SSB-based LR in DRX mode

A.6.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candicate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP without *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.6.1-1, A.6.5.5.6.1-2, A.6.5.5.6.1-3, and A.6.5.5.6.1-4 below. There are two cells, cell 1 is the PCell and cell 2 is the SCell, in the test. UE is not provided by *schedulingRequestID-BFR-SCell-r16*, i.e., no configuration for PUCCH transmission resources, and UE shall perform the random access procedure to recover the beam failure. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.6.1-1 shows the SNR of the CSI-RS in set q_0 in the active SCell to emulate beam failure. Figure A.6.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled in SCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.6.5.5.6.1-1: Supported test configurations for FR1 PCell and SCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.6.5.5.6.1-2: General test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Active SCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf..21	

CORESET Reference Channel	Config 1		CR.1.1 FDD	A.3.1.2
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	A.3.10
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	A.3.11
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 KHz	
	Config 3		30 KHz	
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.1-1	
	Config 3, 6		Table A.3.8.2.1-1	
csi-RS-Index assigned as beam failure detection RS in set q_0 in activated SCell			0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
schedulingRequestID-BFR-SCell-r16			absent	When the field is absent, the random access procedure will be triggered for SCell BFR
SSB Index assigned as CBD RS (q1) in activated SCell			0	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/SCS kHz	-98	Threshold used for $Q_{in\_LR\_SSB}$
	Config 3		-95	

powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0	Config 1		CSI-RS.1.2 FDD	A.3.14 .1
	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD	A.3.14.1
	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned as RLM RS	Config 1		CSI-RS.1.2 FDD	
	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	8.37	
T3		s	6.44	
T4		s	0	
T5		s	1.97	
D1		s	1.93	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.6.5.5.6.1-3: Cell specific test parameters for FR1 SCell for beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Cell 1	Test 1 Cell2				
		T1 to T5	T1	T2	T3	T4	T5

EPRE ratio of PDCCH DMRS to SSS		dB	0	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB						
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_CSI-RS of set q_0	Config 1	dB	5	5	-3	-12	-12	-12
	Config 2	dB	5	5	-3	-12	-12	-12
	Config 3	dB	5	5	-3	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	-10	-10	-10	10	10	10
	Config 2	dB	-10	-10	-10	10	10	10
	Config 3	dB	-10	-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/ SCS kHz	-110	-110	-110	-88	-88	-88
	Config 2		-110	-110	-110	-88	-88	-88
	Config 3		-107	-107	-107	-85	-85	-85
N_{oc}	Config 1	dBm/15 kHz	-98	-98				
	Config 2		-98	-98				
	Config 3		-98	-98				
Propagation condition			TDL-C 300ns 100Hz	TDL-C 300ns 100Hz				
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1. Note 4: Void Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS. Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1. Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.								

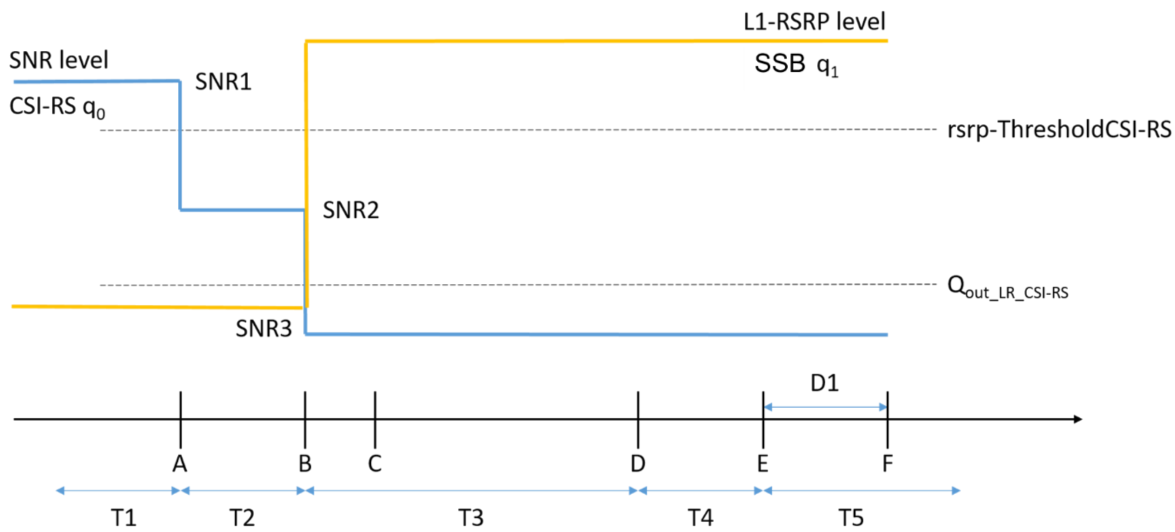

Figure A.6.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in DRX mode

A.6.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble for UL-SCH resource application, followed by MAC-CE on the assigned uplink resources containing a beam associated with the candidate beam set q_1. The UE shall not transmit preamble earlier than time point B.

During T5, the System Simulator shall transmit a Random Access Response to UE after the System Simulator receives the preamble from UE. The UE shall transmit the msg.3 containing candidate beam set q1 for SCell BFR if UE receives the Random Access Response.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6 Active BWP switch

A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of SCell with non-DRX in SA

A.6.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.6.5.6.1.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD - FDD duplex mode
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD - TDD duplex mode
3	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD - FDD duplex mode
4	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD - TDD duplex mode
5	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD - TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth ($BW_{channel}$) defined in each test configuration	

Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.6.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Config 3		TDD	FDD
	Config 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Config 4		Not Applicable	TDDConf.1.1
	Config 5		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	Config 1,2,3,4		Note 7	Note 7
	Config 5		Note 7	Note 7
$BW_{occupied}$	Config 1,2,3,4	RB	52 Note 5	52 Note 5
	Config 5		106 Note 6	106 Note 6
Active BWP ID			1, 2	0
Initial DL BWP Configuration			DLBWP.0.2 Note4	
Initial UL BWP Configuration			ULBWP.0.2 Note4	
Active DL BWP-0 Configuration			DLBWP.0.2 Note4	N.A.
Active DL BWP-1 Configuration			N.A.	DLBWP.1.1 Note4
Active DL BWP-2 Configuration			N.A.	DLBWP.1.3 Note4
Active UL BWP-0 Configuration			ULBWP.0.2 Note4	N.A.
Active UL BWP-1 Configuration			N.A.	ULBWP.1.1 Note4
Active UL BWP-2 Configuration			N.A.	ULBWP.1.3 Note4
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.1.1 FDD
	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Config 4		SR.1.1 FDD	SR.1.1 TDD
	Config 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.1.1 FDD
	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Config 4		CR.1.1 FDD	CR.1.1 TDD
	Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD
	Config 4		CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.3 TDD	CCR.2.3 TDD
OCNG Patterns	Config 1,2,3,4		OP.1 Note 5	
	Config 5		OP.1 Note 6	
SSB Configuration	Config 1,2,3,4		SSB.1 FR1	
	Config 5		SSB.2 FR1	
SMTC Configuration			SMTC.1	
Correlation Matrix and Antenna Configuration			1x2 Low	
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				

EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2	Config 1,2,3,4	dBm/SCS	-104	-104
	Config 5		-101	-101
N_{oc} Note 2		dBm/15KHz	-104	-104
SS-RSRP Note 3	Config 1,2,3,4	dBm/SCS	-87	-87
	Config 5		-84	-84
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
Io Note3	Config 1,2,3,4	dBm/ 9.36MHz	-58.96	-58.96
	Config 5	dBm/ 38.16MHz	-52.86	-52.86
Propagation Condition			AWGN	AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within $BW_{occupied}$.
Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 10 MHz, 52 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured.
Note 6: All UL/DL transmission shall be confined within $BW_{occupied}$ (i.e. 40 MHz, 106 RBs) from $F_{C,low}$, and Io is independent of the $BW_{channel}$ configured.
Note 7: $N_{RB,c}$. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured $BW_{channel}$.

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of PCell interruption during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot (i+ $T_{BWPswitchDelay}$+$k1$), (j+ $T_{BWPswitchDelay}$+$k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.1.2 NR FR1 DL active BWP switch with non-DRX in SA

A.6.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.1.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the cell are specified in Table A.6.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's DL slot (i+$T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot (i+$T_{BWPswitchDelay}$+$k1$). The UE shall be continuously scheduled on Cell1's BWP-2 starting from the first DL slot that occurs after the beginning of slot (i+$T_{BWPswitchDelay}$).

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's slot (j+$T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot (j+$T_{BWPswitchDelay}$+$k1$). The UE shall be continuously scheduled on Cell1's BWP-1 starting from the first DL slot that occurs after the beginning of slot (j+$T_{BWPswitchDelay}$).

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

Table A.6.5.6.1.2.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: A UE which fulfils the requirements in test case A.6.5.6.1.1 can skip the test cases in A.6.5.6.1.2.	

Table A.6.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1
Frequency Range			FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
$BW_{channel}$	Config 1		10 MHz: $N_{RB,c}$ = 52
	Config 2		10 MHz: $N_{RB,c}$ = 52
	Config 3		40 MHz: $N_{RB,c}$ = 106
Active BWP ID			1, 2
Initial DL BWP Configuration	Config 1,2,3		DLBWP.0.2 Note 4
Active DL BWP-1 Configuration	Config 1,2,3		DLBWP.1.1 Note 4
Active DL BWP-2 Configuration	Config 1,2,3		DLBWP.1.3 Note 4
Initial UL BWP Configuration	Config 1,2,3		ULBWP.0.2 Note 4
Active UL BWP-1 Configuration	Config 1,2,3		ULBWP.1.1 Note 4
Active UL BWP-2 Configuration	Config 1,2,3		ULBWP.1.3 Note 4
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD
	Config 2		SR.1.1 TDD
	Config 3		SR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.3 TDD
OCNG Patterns			OP.1
SSB Configuration	Config 1,2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration			SMTC.1
Correlation Matrix and Antenna Configuration			1x2 Low
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
N_{oc} Note 2	Config 1,2	dBm/SCS	-104
	Config 3		-101

N_{oc} Note 2		dBm/15kHz	-104
SS-RSRP Note 3	Config 1,2	dBm/SCS	-87
	Config 3		-84
$\hat{E}_s/I_{ot}$		dB	17
$\hat{E}_s/N_{oc}$		dB	17
Io Note3	Config 1,2	dBm/ 9.36MHz	-58.96
	Config 3	dBm/ 38.16MHz	-52.86
Propagation Condition			AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			

A.6.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, $k1$ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot ($i+T_{BWPswitchDelay}+k1$), ($j+T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.2 RRC-based Active BWP Switch

A.6.5.6.2.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.6.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.2.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of Cell are specified in Table A.6.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in Cell 1.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}} + \mathrm{k1}$ on BWP-1 of final condition. The UE shall be continuously scheduled on PCell's BWP-1 of final condition starting from the first DL slot right after slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$.

$T_{\mathrm{RRCprocessingDelay}}$ and $T_{\mathrm{BWPswitchDelayRRC}}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in Cell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received is received.

Table A.6.5.6.2.1.1-1: DL BWP switch supported test configurations in SA scenario

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.6.2.1.1-2: General test parameters for DL BWP switch in SA scenario

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	s	0.2	

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario

Parameter			Unit	Cell 1
Frequency Range				FR1
Duplex mode		Config 1		FDD
		Config 2,3		TDD
TDD configuration		Config 1		Not Applicable
		Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
$BW_{channel}$		Config 1		10 MHz: $N_{RB,c}$ = 52
		Config 2		10 MHz: $N_{RB,c}$ = 52
		Config 3		40 MHz: $N_{RB,c}$ = 106
Active BWP ID				1
Initial DL BWP Configuration		Config 1,2, 3		DLBWP.0.2
Initial UL BWP Configuration		Config 1,2, 3		ULBWP.0.2
Initial Condition	Active DL BWP-1 Configuration	Config 1, 2, 3		DLBWP.1.3
	Active UL BWP-1 Configuration	Config 1, 2, 3		ULBWP.1.3
Final Condition	Active DL BWP-1 Configuration	Config 1, 2, 3		DLBWP.1.1
	Active UL BWP-1 Configuration	Config 1, 2, 3		ULBWP.1.1
PDSCH Reference measurement channel		Config 1		SR.1.1 FDD
		Config 2		SR.1.1 TDD
		Config 3		SR2.1 TDD
RMSI CORESET parameters		Config 1		CR.1.1 FDD
		Config 2		CR.1.1 TDD
		Config 3		CR2.1 TDD
Dedicated CORESET parameters		Config 1		CCR.1.1 FDD
		Config 2		CCR.1.1 TDD
		Config 3		CCR.2.3 TDD
OCNG Patterns				OP.1
SSB Configuration		Config 1,2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Configuration				SMTC.1
TRS Configuration		Config 1		TRS.1.1 FDD
		Config 2		TRS.1.1 TDD
		Config 3		TRS.1.2 TDD
Antenna Configuration				1x2 Low
Propagation Condition				AWGN
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				

EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS(Note 1)			
N_{oc} Note 2	Config 1,2	dBm/SCS	-104
	Config 3		-101
SS-RSRP Note 3	Config 1,2	dBm/SCS	-87
	Config 3		-84
$\hat{E}_s/I_{ot}$		dB	17
$\hat{E}_s/N_{oc}$		dB	17
Io Note3	Config 1,2	dBm/ 9.36MHz	-58.96
	Config 3	dBm/ 38.16MHz	-52.86
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			

A.6.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the Cell from the first DL slot that occurs right after the begining of slot $\mathrm{i}+\frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$ and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $\mathrm{i}+\frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}+\mathrm{k1}$.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6.3 Simultaneous DCI-based and Timer-based Active BWP Switch on multiple CCs

A.6.5.6.3.1 NR FR1- NR FR1 DL active BWP switch on multiple CCs with non-DRX in SA

A.6.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify requirements on the DL BWP switch delay on multiple CCs and interruption requirement for NR victim cell, both defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.3.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and two NR SCells (Cell 2 and Cell 3) as given in Table A.6.5.6.3.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.3.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 3) to ensure that the UE will have ACK/NACK sending.Before the test starts,

- UE is connected to PCell (Cell 1) on radio channel 1 (PCC), and SCell (Cell 2) on radio channel 2 (SCC) and SCell (Cell 3) on radio channel 3(SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell and SCell (Cell 2), BWP-1 and BWP-2, in Cell 1 and Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for SCell (Cell 3). BWP-0 includes the bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PCell and SCell (Cell 2).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in SCell (Cell 3).
- UE is configured with a *bwp-InactivityTimer* timer value for PCell and SCell (Cell 2).

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for both PCell and SCell (Cell 2) DL BWP switch, sent from the test equipment to the UE, is received at the UE side in both PCell's and SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2 at both PCell and SCell (Cell 2).

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell's and SCell (Cell 2)'s DL slot ($i+ T_{MultipleBWPswitchDelay}$) as defined in clause 8.6.2A.1 and starts to report valid ACK/NACK for the both PCell and SCell (Cell 2) no later than the first UL slot that occurs after the beginning of slot ($i+ T_{MultipleBWPswitchDelay} +k1$). The UE shall be continuously scheduled on both PCell's and SCell (Cell 2)'s BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+ T_{MultipleBWPswitchDelay}$).

The starting time of SCell (Cell 3) interruption due to BWP switch on PCell and SCell (Cell 2) shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell (Cell 1) and SCell (Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1 on both PCell and SCell (Cell 2).

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell's an SCell (Cell 2)'s slot ($j+ T_{MultipleBWPswitchDelay}$) as defined in clause 8.6.2A.1 and starts to report valid ACK/NACK for the PCell and SCell (Cell 2) no later than the first UL slot that occurs after the beginning of slot ($j+ T_{MultipleBWPswitchDelay} +k1$). The UE shall be continuously scheduled on PCell's and SCell (Cell 2)'s BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+ T_{MultipleBWPswitchDelay}$).

The starting time of SCell (Cell 3) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell and SCells by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to SCell (Cell 3) is carried out in the correct time span by monitoring ACK/NACK sent in SCell (Cell 3) during BWP switch of PCell, respectively.

Table A.6.5.6.3.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD -FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
5	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD - TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.6.3.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2; Cell 3	SCell on RF channel number 2 and number 3.
CP length		Normal	
DRX		OFF	For both PCell and SCells (Cell 2 and Cell 3)
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for Cell 1 on SCC.
Cell-individual offset for cells on RF channel number 3	dB	0	Individual offset for Cell 2 on SCC.
Cell2 and Cell 3 timing offset to cell1	µs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	[0.2]	
T2	s	[0.2]	
T3	s	[0.2]	

Table A.6.5.6.3.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1 and Cell 2	Cell 3
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Config 3		TDD	FDD
	Config 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Config 4		Not Applicable	TDDConf.1.1
	Config 5		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	Config 1,2,3,4		10 MHz: $N_{RB,c}$ = 52	10 MHz: $N_{RB,c}$ = 52
	Config 5		40 MHz: $N_{RB,c}$ = 106	40 MHz: $N_{RB,c}$ = 106
Active BWP ID			1, 2	0
Initial DL BWP Configuration			DLBWP.0.2[Note4]	
Initial UL BWP Configuration			ULBWP.0.2[Note4]	
Active DL BWP-0 Configuration			N.A.	DLBWP.0.2[Note4]
Active DL BWP-1 Configuration			DLBWP.1.1[Note4]	N.A.
Active DL BWP-2 Configuration			DLBWP.1.3[Note4]	N.A.
Active UL BWP-0 Configuration			N.A.	ULBWP.0.2[Note4]
Active UL BWP-1 Configuration			ULBWP.1.1[Note4]	N.A.
Active UL BWP-2 Configuration			ULBWP.1.3[Note4]	N.A.
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.1.1 FDD
	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Config 4		SR.1.1 FDD	SR.1.1 TDD
	Config 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.1.1 FDD
	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Config 4		CR.1.1 FDD	CR.1.1 TDD
	Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD

	Config 4		CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns			OP.1	
SSB Configuration	Config 1,2,3,4		SSB.1 FR1	
	Config 5		SSB.2 FR1	
SMTC Configuration			SMTC.1	
Correlation Matrix and Antenna Configuration			1x2 Low	
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2	Config 1,2,3,4	dBm/SCS	-104	-104
	Config 5		-101	-101
N_{oc} Note 2		dBm/15KHz	-104	-104
SS-RSRP Note 3	Config 1,2,3,4	dBm/SCS	-87	-87
	Config 5		-84	-84
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
Io Note3	Config 1,2,3,4	dBm/ 9.36MHz	-58.96	-58.96
	Config 5	dBm/ 38.16MHz	-52.86	-52.86
Propagation Condition			AWGN	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].				

A.6.5.6.3.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for both PCell and SCell (Cell 2) from the first UL slot that occurs after the beginning of DL slot (i+ $T_{MultipleBWPswitchDelay}$ +$k1$).

During T3, the UE shall start to send the ACK/NACK for both PCell and SCell (Cell 2) from the first UL slot that occurs after the beginning of DL slot (j+ $T_{MultipleBWPswitchDelay}$ +$k1$).

Where, $k1$ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{MultipleBWPswitchDelay}$ defined in 8.6.2A.1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 and Cell2 active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell (Cell 3) interruption during PCell and SCell (Cell 2) active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell (Cell 3) shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell and SCell (Cell 2) active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot (i+ $T_{MultipleBWPswitchDelay}$ +$k1$), (j+ $T_{MultipleBWPswitchDelay}$ +$k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.4 SCell dormancy switch

A.6.5.6.4.1 NR FR1 PCell SCell dormancy switch of single FR1 SCell outside active time

A.6.5.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify the SCell dormancy switch delay requirements defined in clause 8.6 when the UE is triggered to switch between dormancy to non-dormancy and non-dormancy to dormancy outside the DRX active time. Further the test purpose is to verify the interruption rate on other serving cells when the UE performing CSI and RRM measurements on dormant SCell(s) as defined in clause 8.2.2.2.12 and also to verify the interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

In the test scenario UE is connected to one PCell (Cell 1) in FR1 and one SCell in FR1. In the test the SCell is switched from non-dormancy to dormancy, and vice versa, at a point in time before start of *onDuration*. The UE is configured to monitor PDCCH for DCI format 2_6 at *ps-Offset* before the start of *onDuration*. Two tests are specified, where a UE that only supports triggering within the first three OFDM symbols of a slot shall undergo Test1 only, and a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo both Test1 and Test2. In the tested scenario, *ps-Offset* is selected to correspond to the dormancy switching time specified in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.4.1.1-1. The general test configuration is given in Table A.6.5.6.4.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.4.1.1-3.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell.
- UE is indicated in *dormantBWP -Id* that the active DL BWP is BWP-2 in the SCell.
- UE is configured with DRX.
- UE is configured to monitor DCI format 2_6, and to be active during *onDuration* even when no DCI format 2_6 is detected (*ps-WakeUp*).

All cells have constant signal levels throughout the test.

The test consists of 4 successive time periods, with durations of T1, T2, T3 and T4, respectively.

During T1,

> Time period T1 starts when a DCI format 2_6 command intended for dormant BWP switch in a SCell from non-dormancy to dormancy, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i* (at *ps-Offset* before *onDuration*). Upon reception of the PDCCH indicating entering dormant BWP in PCell (i.e. through cross-carrier scheduling), UE shall switch the DL BWP-1 to DL BWP-2 in SCell, i.e., switching from non-dormant BWP to dormant BWP and the UE shall complete the switching before the start of *onDuration*.
>
> The UE shall be able to receive PDCCH on PCell no later than the first DL slot that occurs after the beginning of PCell's DL slot (i+ $T_{dormantBWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK on the PCell no later than the first UL slot that occurs after the beginning of slot ($i+N$) as defined in clause 10.3 in TS38.213. The UE shall be continuously scheduled on PCell's BWP-0 no later than the first DL slot that occurs after the beginning of slot (i+ $T_{dormantBWPswitchDelay}$).
>
> The starting time of PCell (Cell 1) interruption due to dormancy switching on SCell shall occur within the dormant BWP switch delay, i.e. before start of *onDuration*.
>
> The UE shall not transmit signals on SCell after the beginning of PCell's DL slot (i+ TdormantBWPswitchDelay) as defined in clause 8.6. The UE shall not be scheduled on SCells BWP-1 no later than the first DL slot that occurs after the beginning of slot (i+ TdormantBWPswitchDelay).

Time period T2 starts when T1 is completed. During T2, the test equipment continues to schedule the UE continuously in PCell. The UE shall carry out CSI and RRM measurements on the dormant SCells. The UE shall report ACK/NACK in PCell in response to scheduled PDSCH, with the maximum loss of transmitted ACK/NACKs fulfilling the requirement in clause 8.2.2.2.12. The test equipment verifies that the loss of ACK/NACKs is no larger than 1.5%.

Time period T3 starts when T2 is completed. During T3, the test equipment does not schedule the UE, by which the inactivity timer expires and the UE stops monitoring PDCCH except for signalling using DCI format 2_6 at wake-up signalling occasions.

During T4,

> Time period T4 starts when a DCI format 2_6 command for leaving dormant BWP in SCell, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted j (at ps-Offset before onDuration). Upon reception of the PDCCH indicating leaving dormant BWP in PCell (i.e. through cross-carrier scheduling), UE shall switch the DL BWP-2 to DL BWP-1 in SCell, i.e., switching from dormant BWP to non-dormant BWP.
>
> The UE shall be able to receive PDSCH on PCell and SCell no later than the first DL slot that occurs after the beginning of PCell's DL slot (j+ $T_{dormantBWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK on the PCell (for both PCell and SCell) no later than the first UL slot that occurs after the beginning of slot ($j+N$) as defined in clause 10.3 in TS 38.213. The UE shall be continuously scheduled on PCell's BWP-0 no later than the first DL slot that occurs after the beginning of slot (j+ $T_{dormantBWPswitchDelay}$).
>
> The starting time of PCell (Cell 1) interruption due to dormancy switching on SCell shall occur within the dormant BWP switch delay.
>
> The UE shall be ready to transmit signals on SCell no later than the first DL slot that occurs after the beginning of PCell's DL slot (j+ TdormantBWPswitchDelay) as defined in clause 8.6. The UE shall be ready to continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot (j+ TdormantBWPswitchDelay).

The test equipment verifies the DL dormant BWP switch time in SCell by counting the slots from the time when the dormant BWP switch command is received till an ACK/NACK on PCell is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during dormant BWP switch of SCell (i.e. before start of *onDuration*), respectively.

Table A.6.5.6.4.1.1-1: SCell dormancy switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD -FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
5	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD - TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.6.4.1.1-2: General test parameters for SCell dormancy switch in SA

Parameter	Unit	Value		Comment
		Test 1	Test 2	
NR RF Channel Number		1, 2		Two NR radio channels are used for this test
Active PCell		Cell 1		PCell on RF channel number 1.
Active SCell		Cell 2		SCell on RF channel number 2.
CP length		Normal		
DRX		ON		For both PCell and SCell
Cell-individual offset for cells on RF channel number 1	dB	0		Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0		Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3		Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
OFDM symbol range in slot for transmission of DCI with dormancy indication		0 – 2	3 – 11	
T1	s	0.2		
T2	s	0.2		

Table A.6.5.6.4.1.1-3: NR Cell specific test parameters for SCell dormancy switch in SA

Parameter		Unit	Cell 1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Config 3		TDD	FDD
	Config 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Config 4		Not Applicable	TDDConf.1.1
	Config 5		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	Config 1,2,3,4		10 MHz: $N_{RB,c}$ = 52	10 MHz: $N_{RB,c}$ = 52
	Config 5		40 MHz: $N_{RB,c}$ = 106	40 MHz: $N_{RB,c}$ = 106
Active BWP ID			0	1
Initial DL BWP Configuration			DLBWP.0.2[Note4]	
Initial UL BWP Configuration			ULBWP.0.2[Note4]	
Active DL BWP-0 Configuration			DLBWP.0.2[Note4]	N.A.
Active DL BWP-1 Configuration			N.A.	DLBWP.1.1[Note4]
Active DL BWP-2 Configuration			N.A.	DLBWP.1.3[Note4]
Active UL BWP-0 Configuration			ULBWP.0.2[Note4]	N.A.
Active UL BWP-1 Configuration			N.A.	ULBWP.1.1[Note4]
Active UL BWP-2 Configuration			N.A.	ULBWP.1.3[Note4]
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.1.1 FDD
	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Config 4		SR.1.1 FDD	SR.1.1 TDD
	Config 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.1.1 FDD
	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Config 4		CR.1.1 FDD	CR.1.1 TDD
	Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET parameters, Test 1	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD
	Config 4		CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD
Dedicated CORESET parameters, Test 2	Config 1		CCR.1.5 FDD	CCR.1.1 FDD
	Config 2		CCR.1.5 TDD	CCR.1.1 TDD
	Config 3		CCR.1.5 TDD	CCR.1.1 FDD
	Config 4		CCR.1.5 FDD	CCR.1.1 TDD
	Config 5		CCR.2.3 TDD	CCR.2.1 TDD
OCNG Patterns			OP.1	
SSB Configuration	Config 1,2,3,4		SSB.1 FR1	
	Config 5		SSB.2 FR1	
SMTC Configuration			SMTC.1	
Correlation Matrix and Antenna Configuration			1x2 Low	
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				

EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2	Config 1,2,3,4	dBm/SCS	-104	-104
	Config 5		-101	-101
N_{oc} Note 2		dBm/15KHz	-104	-104
SS-RSRP Note 3	Config 1,2,3,4	dBm/SCS	-87	-87
	Config 5		-84	-84
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
Io Note3	Config 1,2,3,4	dBm/ 9.36MHz	-58.96	-58.96
	Config 5	dBm/ 38.16MHz	-52.86	-52.86
Propagation Condition			AWGN	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].				

A.6.5.6.4.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($i+N$) (i.e. from the start of *onDuration*).

During time period T2, the UE shall transmit ACK/NACKs in response to scheduling in PCell and the rate of missed ACK/NACKs shall be no more than 1.5%.

During T4, the UE shall start to send the ACK/NACK for PCell and SCell from the first UL slot that occurs after the beginning of DL slot ($j+N$) (i.e. from the start of *onDuration*).

Where, N is the timing that UE provide HARQ-ACK information in response to a detection of a DCI format 2_6 indicating SCell dormancy as specified in [3].

All of the above test requirements shall be fulfilled in order for the observed SCell dormant BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T4, the start time of PCell interruption during SCell dormant BWP switch shall not happen outside the dormant BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for dormant BWP switch in clause 8.6.

NOTE: During T1, T4 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot ($i+ N$), ($j+ N$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.4.2 NR FR1 PCell SCell dormancy switch of two FR1 SCells inside active time

A.6.5.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of SCell dormancy switching delay requirements in clause 8.6.2A, requirements on interruptions due to SCell dormancy switching in clause 8.2.2.2.12.1, and requirements on interruptions due to CSI and RRM measurements on dormant SCells in clauses 8.2.2.2.12.2 and 8.2.2.2.12.3, respectively. In the tested scenario, the UE is connected to PCell and two SCells in FR1, and the SCells are switched from non-dormancy to dormancy, and back, during active time. Depending on UE capability on whether DCI for dormancy switching can be received also later than within the initial three OFDM symbols of a slot, the UE may have to undergo one or two sets of tests. A UE that only supports triggering during within the first three OFDM symbols of a slot shall only undergo Test1 and Test2, whereas a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo Test1 through Test4.

The supported test configurations are provided in Table A.6.5.6.4.2.1-1 below. General test parameters are provided in Table A.6.5.6.4.2.1-2, and cell-specific parameters are provided in Table A.6.5.6.4.2.1-3 below.

The tests consist of three consecutive time periods T1, T2, and T3, respectively.

Three carriers are used in the test, each within FR1 and each with one cell. Cell 1 (PCell) is on RF channel 1 (PCC), Cell 2 (SCell1) is on RF channel 2 (SCC1), and Cell 3 (SCell2) is on RF channel 3 (SCC2). All three cells have constant signal levels throughout the test. The UE is continuously scheduled in PCell throughout the test.

Before the test starts,

- UE is connected to Cell 1 (PCell), Cell 2 (SCell1) and Cell 3 (SCell2).
- UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 1. BWP-0 includes the bandwidth of the initial DL BWP and SSB.
- UE is configured with one non-dormant and one dormant UE-specific downlink bandwidth part, BWP-0 and BWP-1, respectively, for Cell 2 and Cell 3. BWP-0 includes the bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 1 is BWP-0.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 2 is BWP-0.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 3 is BWP-0.
- UE is continuously scheduled in PCell, SCell1 and SCell2.

T1 starts at the point in time at which the UE receives a DCI with dormancy indication on PDCCH in PCell at the antenna connector, in a slot # denoted *m*, pertaining to dormancy indication for switching SCell1 and SCell2 from non-dormancy to dormancy. The UE shall complete switching of the SCells to dormancy by the end of slot m + ceil($T_{MultipleBWPswitchDelay}$/NR slot length) + 1 in Test1 and Test2, and slot m + ceil($T_{MultipleBWPswitchDelay}$/NR slot length) + 2 in Test3 and Test4, as specified in clause 8.6.2A. Any PCell interruptions due to the switching between non-dormant and dormant BWPs shall fulfill requirements in clause 8.2.2.2.12.1. The test equipment verifies that interruptions due to switching from non-dormancy to dormancy are within the requirements by analysing HARQ feedback transmitted in PCell for PCell.

During T2, the UE is carrying out CSI and RRM measurements on dormant SCell1 and SCell2. Any PCell interruptions due to CSI and RRM measurements shall fulfill requirements in clauses 8.2.2.2.12.2 and 8.2.2.2.12.3, respectively. The test equipment verifies that the interruptions are within the allowed percentages by counting ACK/NACKs in PCell. At the end of T2, the test equipment transmits a DCI with dormancy indication on PDCCH in PCell carrying a dormany indication for switching SCell1 and SCell2 from dormancy to non-dormancy.

T3 starts at the point in time at which the UE receives a DCI with dormancy indication on PDCCH in PCell at the antenna connector, in a slot # denoted *n*, pertaining to dormancy indication for switching SCell1 and SCell2 from dormancy to non-dormancy. The UE shall complete switching of the SCells to non-dormancy by the end of slot n +

ceil($T_{MultipleBWPswitchDelay}$/NR slot length) + 1 in Test1 and Test2, and slot n + ceil($T_{MultipleBWPswitchDelay}$/NR slot length) + 2 in Test3 and test4, as specified in clause 8.6.2A. Any PCell interruptions due to the switching between dormant and non-dormant BWPs shall fulfill requirements in clause 8.2.2.2.12.1. The test equipment verifies that interruptions due to switching from dormancy to non-dormancy are within the requirements by analysing HARQ feedback transmitted in PCell for PCell. The test equipment verifies the switching delay by analysing HARQ feedback transmitted in PCell for SCells.

Table A.6.5.6.4.2.1-1: Supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.6.4.2.1-2: General test parameters

Parameter	Unit	Value				Comment
		Test1	Test2	Test3	Test4	
NR RF Channel Number		1, 2, 3				Three NR radio channels are used for this test
Active PCell		Cell 1				Primary cell on NR RF channel number 1 in FR1
SCell1		Cell 2				SCell1 on NR RF channel number 2 in FR1
SCell2		Cell 3				SCell2 on NR RF channel number 3 in FR1
CP length		Normal				
DRX		OFF				Continuous monitoring of primary cell
CSI reporting periodicity, Non-dormant BWP	ms	2				CSI reporting periodicity for periodic reporting of CQI for PCell and non-dormant SCells
CSI reporting periodicity, Dormant BWP	ms	40				CSI reporting periodicity for periodic reporting of CQI for dormant SCells
Timing offset between Cell 1 and Cell 2	ns	0				
Timing offset between Cell 1 and Cell 3	ns	0				
Triggering DCI format		1_1	0_1	1_1	0_1	Triggering DCI format for triggering during active time
OFDM symbol range in slot for transmission of DCI with dormancy indication		0 – 2		3 – 11		Test1 and Test3 are based on that triggering DCI is received within the first three OFDM symbols of a slot.Test2 and Test4 are based on that the triggering DCI is received later than within the first three OFDM symbols of a slot.
T1	s	0.2				
T2	s	5				
T3	s	0.2				

Table A.6.5.6.4.2.1-3: NR Cell specific test parameters

Parameter		Unit	Cell 1	Cell 2	Cell 3
Frequency range			FR1		
NR RF channel			1	2	3
Duplex mode	Config 1		FDD		
	Config 2,3		TDD		
TDD configuration	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52		
	Config 3		40: $N_{RB,c}$ = 106		
Downlink initial BWP configuration			DLBWP.0.1	DLBWP.0.1	DLBWP.0.1
Uplink initial BWP configuration			ULBWP.0.1	---	---
Downlink active non-dormant BWP-0 configuration			DLBWP.1.1	DLBWP.1.1	DLBWP.1.1
Downlink active dormant BWP-1 configuration			---	DLBWP.1.1	DLBWP.1.1
Uplink active BWP-0 configuration			ULBWP.1.1	---	---
TCI state			TCI.State.0	TCI.State.0	TCI.State.0
CSI-RS configuration for CSI reporting, Non-dormant BWP	Config 1		CSI-RS.1.1 FDD	CSI-RS.1.1 FDD	CSI-RS.1.1 FDD
	Config 2		CSI-RS.1.1 TDD	CSI-RS.1.1 TDD	CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD	CSI-RS.2.1 TDD	CSI-RS.2.1 TDD
CSI-RS configuration for CSI reporting, Dormant BWP	Config 1		---	CSI-RS.1.6 FDD	CSI-RS.1.6 FDD
	Config 2			CSI-RS.1.5 TDD	CSI-RS.1.5 TDD
	Config 3			CSI-RS.2.6 TDD	CSI-RS.2.6 TDD
TRS Configuration	Config 1		TRS.1.1 FDD	TRS.1.1 FDD	TRS.1.1 FDD
	Config 2		TRS.1.1 TDD	TRS.1.1 TDD	TRS.1.1 TDD
	Config 3		TRS.1.2 TDD	TRS.1.2 TDD	TRS.1.2 TDD
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.1.1 FDD	SR.1.1 FDD
	Config 2		SR.1.1 TDD	SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.2.1 TDD	SR.2.1 TDD	SR.2.1 TDD
Dedicated CORESET parameters, Test 1,2	Config 1		CCR.1.1 FDD	CCR.1.1 FDD	CCR.1.1 FDD
	Config 2		CCR.1.1 TDD	CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.2.1 TDD	CCR.2.1 TDD	CCR.2.1 TDD
Dedicated CORESET parameters, Test 3,4	Config 1		CCR.1.5 FDD	CCR.1.1 FDD	CCR.1.1 FDD
	Config 2		CCR.1.5 TDD	CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.2.3 TDD	CCR.2.1 TDD	CCR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	---	---
	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
OCNG Pattern			OP.1	OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 3		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
SMTC configuration			SMTC.1	SMTC.1	SMTC.1
EPRE ratio of PSS to SSS		dB	0		
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS Note1					
EPRE ratio of OCNG to OCNG DMRS Note1					
N_{oc} Note2	Config 1,2	dBm/15kHz	-104	-104	-104
	Config 3		-101	-101	-101

$\hat{E}_s/I_{ot}$		dB	17	17	17
$\hat{E}_s/N_{oc}$		dB	17	17	17
SS-RSRP Note3	Config 1,2	dBm/SCS	-87	-87	-87
	Config 3		-84	-84	-84
Io Note3	Config 1,2	dBm/9.36 MHz	-59.0	-59.0	-59.0
	Config 3	dBm/38.16 MHz	-52.9	-52.9	-52.9
Propagation condition			AWGN	AWGN	AWGN
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
Note 1: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP, SCH_RP, and Io levels have been derived from other parameters for information purpose. They are not settable parameters themselves.					

A.6.5.6.4.2.2 Test Requirements

During T1, any interruption on PCell due to dormancy switching of SCells shall be within the requirement specified in clause 8.2.2.2.12.1.

During T2, interruptions on PCell due to CSI and RRM measurements on dormant SCells shall be within the interruption rate requirements specified in clauses 8.2.2.2.12.2 and 8.2.2.2.12.3, respectively.

During T3, any interruption on PCell due to dormancy switching of SCells shall be within the requirement specified in clause 8.2.2.2.12.1. Monitoring of PDCCH for SCell in SCell shall be resumed within the dormancy switching time specified in clause 8.6.2A.

For an event to be considered to be correct, all requirements above have to be fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6.5 Simultaneous RRC-based Active BWP Switch on multiple CCs

A.6.5.6.5.1 NR FR1- NR FR1 DL active BWP switch on multiple CCs with non-DRX in SA

A.6.5.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify requirements on the RRC-based DL BWP switch delay on multiple CCs defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.5.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2) as given in Table A.6.5.6.5.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.5.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (SCell) on radio channel 2 (SCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for PCell and SCell (Cell 2).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PCell and SCell (Cell 2).

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration for both PCell and SCell (Cell 2), sent from the test equipment to the UE, is completely received at the UE side in PCell's and SCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition for both PCell and SCell (Cell 2).

The UE shall be able to receive PDSCH on PCell and SCell (Cell 2) from the first DL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length}$ as defined in clause 8.6.3A.1 and starts to report valid ACK/NACK for the PCell and SCell (Cell 2) from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length} + k1$ on BWP-1 of final condition. The UE shall be continuously scheduled on PCell's and SCell (Cell 2)'s BWP-1 of final condition starting from the first DL slot right after slot $i + \frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length}$.

$T_{RRCprocessingDelay}$, $T_{BWPswitchDelayRRC}$ and D_{RRC} are defined in clause 8.6.3A.1, N=2 in this test case.

The test equipment verifies the DL BWP switch time in PCell and SCell by counting the slots from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.6.5.6.5.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
5	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD – TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.6.5.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell (Cell 2)
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cell on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cell on SCC.
Cell 2 timing offset to Cell 1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	[0.2]	

Table A.6.5.6.5.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter			Unit	Cell 1	Cell 2
Frequency Range				FR1	
Duplex mode		Config 1		FDD	FDD
		Config 2,5		TDD	TDD
		Config 3		TDD	FDD
		Config 4		FDD	TDD
TDD configuration		Config 1		Not Applicable	Not Applicable
		Config 2		TDDConf.1.1	TDDConf.1.1
		Config 3		TDDConf.1.1	Not Applicable
		Config 4		Not Applicable	TDDConf.1.1
		Config 5		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$		Config 1,2,3,4		10 MHz: $N_{RB,c}$ = 52	10 MHz: $N_{RB,c}$ = 52
		Config 5		40 MHz: $N_{RB,c}$ = 106	40 MHz: $N_{RB,c}$ = 106
Active BWP ID				1	
Initial DL BWP Configuration				DLBWP.0.2 Note4	
Initial UL BWP Configuration				ULBWP.0.2 Note4	
Initial Condition	Active DL BWP-1 Configuration			DLBWP.1.3 Note4	
	Active UL BWP-1 Configuration			ULBWP.1.3 Note4	
Final Condition	Active DL BWP-1 Configuration			DLBWP.1.1 Note4	
	Active UL BWP-1 Configuration			ULBWP.1.1 Note4	
PDSCH Reference measurement channel		Config 1		SR.1.1 FDD	SR.1.1 FDD
		Config 2		SR.1.1 TDD	SR.1.1 TDD
		Config 3		SR.1.1 TDD	SR.1.1 FDD
		Config 4		SR.1.1 FDD	SR.1.1 TDD
		Config 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET parameters		Config 1		CR.1.1 FDD	CR.1.1 FDD
		Config 2		CR.1.1 TDD	CR.1.1 TDD
		Config 3		CR.1.1 TDD	CR.1.1 FDD
		Config 4		CR.1.1 FDD	CR.1.1 TDD
		Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET parameters		Config 1		CCR.1.1 FDD	CCR.1.1 FDD
		Config 2		CCR.1.1 TDD	CCR.1.1 TDD
		Config 3		CCR.1.1 TDD	CCR.1.1 FDD
		Config 4		CCR.1.1 FDD	CCR.1.1 TDD
		Config 5		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns				OP.1	
SSB Configuration		Config 1,2,3,4		SSB.1 FR1	
		Config 5		SSB.2 FR1	
SMTC Configuration				SMTC.1	
		Config 1		TRS.1.1 FDD	TRS.1.1 FDD
		Config 2		TRS.1.1 TDD	TRS.1.1 TDD
		Config 3		TRS.1.1 TDD	TRS.1.1 FDD
		Config 4		TRS.1.1 FDD	TRS.1.1 TDD
		Config 5		TRS.1.2 TDD	TRS.1.2 TDD
Correlation Matrix and Antenna Configuration				1x2 Low	
Propagation Condition				AWGN	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					

EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
N_{oc} Note 2	Config 1,2,3,4	dBm/SCS	-104
	Config 5		-101
SS-RSRP Note 3	Config 1,2,3,4	dBm/SCS	-87
	Config 5		-84
$\hat{E}_s/I_{ot}$		dB	17
$\hat{E}_s/N_{oc}$		dB	17
Io Note3	Config 1,2,3,4	dBm/ 9.36MHz	-58.96
	Config 5	dBm/ 38.16MHz	-52.86
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			

A.6.5.6.5.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for both PCell and SCell (Cell 2) from the first DL slot that occurs right after the begining of slot $(\mathrm{i} + \frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length})$ and starts to report valid ACK/NACK for both PCell and SCell (Cell 2) from the first UL slot that occurs after the beginning of DL slot $(\mathrm{i} + \frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length} + \mathrm{k1})$.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch on PCell and SCell (Cell 2) within the time duration $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC} + D_{RRC}$ defined in 8.6.3A.1.

All of the above test requirements shall be fulfilled in order for the observed PCell and SCell (Cell 2) active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot $(i+ \frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length} +k1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.7 DL interruptions at switching between two uplink carriers

A.6.5.7.1 DL interruptions at switching between two uplink carriers in FDD-TDD CA

A.6.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify DL interruption requirements during UE dynamic switching between two uplink carriers defined in clause 8.2.2.2.10. The test case is applicable for an uplink band pair of an inter-band FDD-TDD CA configuration when the capability *uplinkTxSwitchingPeriod* is present.

There are two cells: FR1 FDD PCell (Cell 1), FR1 TDD SCell (Cell 2). The test parameters for the two cells are given in Table A.6.5.7.1.1-1, Table A.6.5.7.1.1-2 and Table A.6.5.7.1.1-3 below.

For NR FDD carrier (Cell 1), aperiodic CSI-RS for L1-RSRP reporting is triggered with power boosting [6dB] on the following symbol in the slot overlapping with the special slot of the NR TDD carrier (Cell 2):

- symbol#12 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
- otherwise,
    - symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 210us or
    - symbol #9 if UE capability *uplinkTxSwitchingPeriod* is 140us or
    - symbol #10 if UE capability *uplinkTxSwitchingPeriod* is 35us.

For NR TDD carrier (Cell 2), aperiodic CSI-RS for L1-RSRP reporting is configured with power boosting [6dB] on the following symbol in the special slot:

- symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
- otherwise,
    - symbol #4 if UE capability *uplinkTxSwitchingPeriod* is 210us or
    - symbol #5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
    - symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

This test verifies that the UE correctly report the L1-RSRP reporting. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, *uplinkTxSwitching* is indicated to UE.

Table A.6.5.7.1.1-1: Supported test configurations

Configuration	Description
1	NR Cell 1: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR Cell 2: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.6.5.7.1.1-2: General test parameters for DL interruptions at switching between two uplink carriers in FDD-TDD CA

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1	1, 2	Two radio channels are used for this test.
Active cell		Config 1	Cell 1: FR1 PCell Cell 2: FR1 SCell	FR1 PCell on RF channel number 1 FR1 SCell on RF channel number 2
CP length		Config 1	Normal	
DRX		Config 1	OFF	
Measurement gap pattern Id		Config 1	OFF	
Filter coefficient		Config 1	0	L3 filtering is not used
CSI-RS configuration for L1-RSRP reporting		Config 1	Cell 1: CSI-RS.1.5 FDD Cell 2: CSI-RS.2.5 TDD	
T1	s	Config 1	5	

Table A.6.5.7.1.1-3: Cell specific test parameters for DL interruptions at switching between two uplink carriers in FDD-TDD CA

Parameter		Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	TDD
TDD configuration	Config 1		N/A	TDDConf.2.1 except that: S='11DL: 1GP:2UL'; *nrofDownlinkSymbols: 11* *nrofUplinkSymbols: 2*
$BW_{channel}$	Config 1		10 MHz: $N_{RB,c}$ = 52	40 MHz: $N_{RB,c}$ = 106
Initial BWP Configuration	Config 1		DLBWP.0.1	DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1	DLBWP.1.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1	ULBWP.1.1
SRS configuration	Config 1		SRS configuration in Table A.4.4.1.1.1-3 is applied except that: resourceMappingstartPosition: 0resourceMappingnrofSymbols: n2	SRS configuration in Table A.4.4.1.1.1-3 is applied except that: resourceMappingstartPosition: 0 resourceMappingnrofSymbols: n2
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD	CCR.2.1 TDD
OCNG Patterns			OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
SSB Configuration	Config 1		SSB.1 FR1	SSB.2 FR1
Correlation Matrix and Antenna Configuration			1x2 Low	2x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2		dBm/15 kHz	-104	-104
SS-RSRP Note 3		dBm/SCS	-87	84
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
N_{oc} Note 2	Config 1	dBm/SCS	-104	-101
Io Note3	Config 1	dBm/9.36 MHz	-58.96	-
		dBm/ 38.16MHz	-	-52.86
Time offset to Cell1 Note 5		µs	-	0
Propagation Condition			AWGN	AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

A.6.5.7.1.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.2.2.2.10.

UE shall send L1-RSRP report while meeting the accuracy requirements defined in clause 10.1.19.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.7.2 DL interruptions at switching between two uplink carriers in TDD-TDD CA

A.6.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify DL interruption requirements during UE dynamic switching between two uplink carriers defined in clause 8.2.2.2.10. The test case is applicable for an uplink band pair of an inter-band TDD-TDD CA configuration when the capability *uplinkTxSwitchingPeriod* is present.

There are two cells: FR1 TDD PCell (Cell 1), FR1 TDD SCell (Cell 2). The test parameters for the two cells are given in Table A.6.5.7.2.1-1, Table A.6.5.7.2.1-2 and Table A.6.5.7.2.1-3 below.

For NR TDD PCell (Cell 1), aperiodic CSI-RS for L1-RSRP reporting is triggered with power boosting [6dB] on the following symbol in the special slot:

- symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
- otherwise,
    - symbol #4 if UE capability *uplinkTxSwitchingPeriod* is 210us or
    - symbol #5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
    - symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

For NR TDD SCell (Cell 2), aperiodic CSI-RS for L1-RSRP reporting is configured with power boosting [6dB] on the following symbol on the 2nd special slot of every 8 slots:

- symbol#10 if UE does not report *uplinkTxSwitching-DL-Interruption-r16;*
- otherwise,
    - symbol #4 if UE capability *uplinkTxSwitchingPeriod* is 210us or
    - symbol #5 if UE capability *uplinkTxSwitchingPeriod* is 140us or
    - symbol #8 if UE capability *uplinkTxSwitchingPeriod* is 35us.

This test verifies that the UE correctly report the L1-RSRP reporting. The test case is only applicable to UE which supports *simultaneousRxTxInterBandCA.*

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, *uplinkTxSwitching* is indicated to UE.

Table A.6.5.7.2.1-1: Supported test configurations

Configuration	Description
1	NR Cell 1: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR Cell 2: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.6.5.7.2.1-2: General test parameters for DL interruptions at switching between two uplink carriers in TDD-TDD CA

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1	1, 2	Two radio channels are used for this test.
Active cell		Config 1	Cell 1: FR1 PCell Cell 2: FR1 SCell	FR1 PCell on RF channel number 1 FR1 SCell on RF channel number 2
CP length		Config 1	Normal	
DRX		Config 1	OFF	
Measurement gap pattern Id		Config 1	OFF	
Filter coefficient		Config 1	0	L3 filtering is not used
CSI-RS configuration for L1-RSRP reporting		Config 1	Cell 1: CSI-RS.2.5 TDD Cell 2: CSI-RS.2.5 TDD	
T1	s	Config 1	5	

Table A.6.5.7.2.1-3: Cell specific test parameters for DL interruptions at switching between two uplink carriers in TDD-TDD CA

Parameter		Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		TDD	TDD
TDD configuration	Config 1		TDDConf.2.1 except that S='1 1DL: :2UL'; *nrofDownlinkSymbols: 11* *nrofUplinkSymbols: 2*	TDDConf.2.2
$BW_{channel}$	Config 1		40 MHz: $N_{RB,c}$ = 106	40 MHz: $N_{RB,c}$ = 106
Initial BWP Configuration	Config 1		DLBWP.0.1	DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1	DLBWP.1.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1	ULBWP.1.1
SRS configuration	Config 1		SRS configuration in Table A.4.4.1.1.1-3 is applied except that: resourceMappingstartPosition: 0 resourceMappingnrofSymbols: n2	SRS configuration in Table A.4.4.1.1.1-3 is applied except that: resourceMappingstartPosition: 0 resourceMappingnrofSymbols: n2
PDSCH Reference measurement channel	Config 1		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET parameters	Config 1		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET parameters	Config 1		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns			OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
SSB Configuration	Config 1		SSB.2 FR1	SSB.2 FR1
Correlation Matrix and Antenna Configuration			1x2 Low	2x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2		dBm/15 kHz	-104	-104
SS-RSRP Note 3		dBm/SCS	84	84
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
N_{oc} Note 2	Config 1	dBm/SCS	-104	-101
Io Note3	Config 1	dBm/9.36 MHz	-58.96	-
		dBm/ 38.16MHz	-	-52.86
Time offset to Cell1 Note 5		µs	-	0
Propagation Condition			AWGN	AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

A.6.5.7.2.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.2.2.2.10.

UE shall send L1-RSRP report while meeting the accuracy requirements defined in clause 10.1.19.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.8 UE specific CBW change

A.6.5.8.1 UE specific CBW change on PCell in FR1 in non-DRX

A.6.5.8.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13.

The supported test configurations are shown in Table A.6.5.8.1.1-1. The test scenario comprises of one Cell (Cell 1), which is PCell as given in Table A.6.5.8.1.1-2. Cell-specific parameters are specified in Table A.6.5.8.1.1-3.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE sends ACK/NACK during the test.

Before the test starts:

- UE is connected to Cell 1 (PCell) on radio channel 1.
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PCell.
- UE has been configured with UE specific CBW (CBW-1).
- UE is indicated in *SCS-SpecificCarrier* [2] that the UE specific CBW is CBW-1 as the initial condition in Cell 1 (PCell).

Cell1 (PCell) has constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* containing *SCS-SpecificCarrier* with updated UE specific CBW, sent from the test equipment to the UE, is completely received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its UE specific CBW with the updated CBW-2 for the final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay}+T_{CBWchangeDelayRRC}}{NR\ Slot\ length}$ as defined in clause 8.13 and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{CBWchangeDelayRRC}}{NR\ Slot\ length} + k1$ on the PCell's BWP-1 on CBW-2 for the final condition. The UE shall be continuously scheduled on the PCell's BWP-1 on CBW-2 for the final condition starting from the first DL slot right after slot $i + \frac{T_{RRCprocessingDelay} + T_{CBWchangeDelayRRC}}{NR\ Slot\ length}$.

$T_{RRCprocessingDelay}$ and $T_{CBWchangeDelayRRC}$ are defined in clause 8.13.

The test equipment verifies the UE specific CBW switching delay in PCell by estimating the time from the moment the RRC Reconfiguration message including updated UE specific CBW configuration is sent until the moment a vaild ACK/NACK is received.

Table A.6.5.8.1.1-1: Supported test configurations for UE specific CBW change in SA scenario

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.6.5.8.1.1-2: General test parameters for UE specific CBW change in SA scenario

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	s	0.2	

Table A.6.5.8.1.1-3: NR Cell specific test parameters for UE specific CBW change in SA scenario

Parameter			Unit	Cell 1
Frequency Range				FR1
Duplex mode		Config 1		FDD
		Config 2,3		TDD
TDD configuration		Config 1		Not Applicable
		Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
$BW_{channel}$		Config 1		10 MHz: $N_{RB,c}$ = 52
		Config 2		10 MHz: $N_{RB,c}$ = 52
		Config 3		40 MHz: $N_{RB,c}$ = 106
Active DL BWP ID		Config 1,2, 3		1
Initial DL BWP Configuration (BWP-1)		Config 1,2, 3		DLBWP.0.2
Initial UL BWP Configuration		Config 1,2, 3		ULBWP.0.2
Initial Condition	Active DLCBW-1 Configureation	Config 1, 2, 3		DLCBW.1.1
	Active UL CBW-1 Configuration	Config 1, 2, 3		ULCBW.1.1
Final Condition	Active DLCBW-1 Configureation	Config 1, 2, 3		DLCBW.1.2
	Active UL CBW-1 Configuration	Config 1, 2, 3		ULCBW.1.2
PDSCH Reference measurement channel		Config 1		SR.1.1 FDD
		Config 2		SR.1.1 TDD
		Config 3		SR2.1 TDD
RMSI CORESET parameters		Config 1		CR.1.1 FDD
		Config 2		CR.1.1 TDD
		Config 3		CR2.1 TDD
Dedicated CORESET parameters		Config 1		CCR.1.1 FDD
		Config 2		CCR.1.1 TDD
		Config 3		CCR.2.1 TDD
OCNG Patterns				OP.1
SSB Configuration		Config 1,2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Configuration				SMTC.1
TRS Configuration		Config 1		TRS.1.1 FDD
		Config 2		TRS.1.1 TDD
		Config 3		TRS.1.2 TDD
Antenna Configuration				1x2 Low
Propagation Condition				AWGN
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS(Note 1)				
N_{oc} Note 2		Config 1,2	dBm/SCS	-104
		Config 3		-101
SS-RSRP Note 3		Config 1,2	dBm/SCS	-87
		Config 3		-84
$\hat{E}_s/I_{ot}$			dB	17

$\hat{E}_s/N_{oc}$		dB	17
Io[Note3]	Config 1,2	dBm/ 9.36MHz	-58.96
	Config 3	dBm/ 38.16MHz	-52.86
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.1 is linked with ULBWP.0.1; DLBWP.1.1 is linked with ULBWP.1.1; as defined in clause 12 of TS 38.213 [3].			

A.6.5.8.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the PCell from the first DL slot that occurs right after the begining of slot $i + \frac{T_{RRCprocessingDelay}+T_{CBWchangeDelayRRC}}{NR\ Slot\ length}$ and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay}+T_{CBWchangeDelayRRC}}{NR\ Slot\ length} + k1$.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed UE specific CBW change delay on the PCell to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6 Measurement procedure

A.6.6.1 Intra-frequency Measurements

A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.1.1.1-1 and A.6.6.1.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.1.1.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.1.1.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	s	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	5	

Table A.6.6.1.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	--64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	--58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.2 SA event triggered reporting tests without gap under DRX

A.6.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.2.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.2.2-1, A.6.6.1.2.2-2 and A.6.6.1.2.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.2.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.1.2.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	s	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX. 7	
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	s	1, 2, 3	5		
T2	s	1, 2, 3	5	10	

Table A.6.6.1.2.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	--64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	--58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.2.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX

A.6.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.3.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.3.1-1 and A.6.6.1.3.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.3.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
		2	CSI-RS.1.2 TDD resource #0	
		3	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	s	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX	ms	1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	5	

Table A.6.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.2 FDD		CCR.1.1 FDD	
		2	CCR.1.2 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.2		ULBWP.1.1	
RLM-RS		1, 2, 3	CSI-RS		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1, 2, 3	4	-1.46	-Infinity	-1.46
$\hat{E}_s/N_{oc}$	dB	1, 2, 3	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	--64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	--58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX

A.6.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.4.2-1, A.6.6.1.4.2-2 and A.6.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.4.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.1.4.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2		
Measurement gap type		1, 2, 3	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3	40		
Measurement gap length	ms	1, 2, 3	6		
Measurement gap offset	ms	1, 2, 3	39		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0		
		2	CSI-RS.1.2 TDD resource #0		
		3	CSI-RS.2.2 TDD resource #0		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	s	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX. 7	
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	s	1, 2, 3	5		
T2	s	1, 2, 3	5	10	

Table A.6.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.2 FDD		CCR.1.1 FDD	
		2	CCR.1.2 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.2		ULBWP.1.1	
RLM-RS		1, 2, 3	CSI-RS		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	--58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1:	Table A.6.6.1.4.2-1The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Table A.6.6.1.4.2-1Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	Table A.6.6.1.4.2-1SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.1.4.2-4: Void

Table A.6.6.1.4.2-5: Void

A.6.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading

A.6.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.6.6.1.5.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.5.2-1 and A.6.6.1.5.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.5.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.5.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configuration	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	s	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	s	1	5	
T2	s	1	5	

Table A.6.6.1.5.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
OCNG Patterns		1	OP.1		OP.1	
TRS configuration		1	TRS.1.1 FDD		N/A	
IInitial BWP configuration		1	DLBWP.0,1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
N_{oc} Note 2	dBm/15 kHz	1	-98			
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
Propagation Condition		1	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading

A.6.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.6.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.6.2-1 and A.6.6.1.6.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.6.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.6.2-2: General test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configuration	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	s	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	s	1	5	
T2	s	1	5	

Table A.6.6.1.6.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
Dedicated CORESET RMC configuration		1	CCR.1.2 FDD		CCR.1.1 FDD	
OCNG Patterns		1	OP.1		OP.1	
TRS configuration		1	TRS.1.1 FDD		N/A	
IInitial BWP configuration		1	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1	DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1	ULBWP.1.2		ULBWP.1.1	
RLM-RS		1	CSI-RS		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
N_{oc} Note 2	dBm/15 kHz	1	-98			
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
Propagation Condition		1	AWGN			
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.7 SA event triggered reporting tests under DRX for UE configured with highSpeedMeasFlag-r16

A.6.6.1.7.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for UE configured with highSpeedMeasFlag-r16. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.7.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.7.2-1, A.6.6.1.7.2-2 and A.6.6.1.7.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.7.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.1.7.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX for UE configured with highSpeedMeasFlag-r16

Parameter	Unit	Test configuration	Value	Comment
highSpeedMeasFlag-r16		1,2,3	Present	To enable high speed measurement enhancements
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	s	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	DRX.7	640ms DRX cycle
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 µs	Synchronous cells
		3	3 µs	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	6	

Table A.6.6.1.7.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX for UE configured with highSpeedMeasFlag-r16

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1, 2, 3	4	-1.46	-Infinity	-1.46
$\hat{E}_s/N_{oc}$	dB	1, 2, 3	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2	AWGN		AWGN 1944Hz Note 4	
		3	AWGN		AWGN 3334Hz Note 5	

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944Hz.
Note 5:	The AWGN 3334 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 3334Hz.

A.6.6.1.7.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2 Inter-frequency Measurements

A.6.6.2.1 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.6.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.1.1-1, A.6.6.2.1.1-2 and A.6.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.1.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	1	1	

Table A.6.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD			
			Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD			
			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
Dedicated CORESET Reference Channel			Config 1	CCR.1.1 FDD			
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz		-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						

A.6.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.2 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.6.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.2.1-1, A.6.6.2.2.1-2 and A.6.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2				Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2				NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9		9		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX. 7	DRX.1	DRX. 7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	1.1	11	1.1	11	

Table A.6.6.2.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP		Config 1, 2, 3	ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		NA	
			Config 2	SR.1.1 TDD		NA	
			Config 3	SR2.1 TDD		NA	
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		NA	
			Config 2	CR.1.1 TDD		NA	
			Config 3	CR.2.1 TDD		NA	
Dedicated CORESET Reference Channel			Config 1	CCR.1.1 FDD		NA	
			Config 2	CCR.1.1 TDD		NA	
			Config 3	CCR.2.1 TDD		NA	
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							

EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz	Config 1,2,3	-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.6.6.2.2.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3 Value	Test2&4 Value	Comment
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.6.6.2.2.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.6.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.3 Void

A.6.6.2.4 Void

A.6.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.6.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.5.1-1, A.6.6.2.5.1-2 and A.6.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	1.1	1	

Table A.6.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD			
			Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
Dedicated CORESET Reference Channel			Config 1	CCR.1.1 FDD		-	
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							

EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz		-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38.16MHz	Config 3	-58.4	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						

A.6.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.6 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.6.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.6.1-1, A.6.6.2.6.1-2 and A.6.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2				Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2				NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9		9		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX. 7	DRX.1	DRX. 7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3 ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3 μs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	1.3	13.5	1.3	13.5	

Table A.6.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		NA	
			Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
Dedicated CORESET Reference Channel			Config 1	CCR.1.1 FDD		-	
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							

EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz		-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.7 Void

A.6.6.2.8 Void

A.6.6.2.9 SA event triggered reporting tests with additional mandatory gap pattern

A.6.6.2.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when mandatory gap pattern with 3ms MGL is configured.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.9.1-1, A.6.6.2.9.1-2 and A.6.6.2.9.1-3.

In test 1 measurement gap pattern configuration # 3 as defined in Table A.6.6.2.9.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #2 as defined in Table A.6.6.2.9.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #2, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.9.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.9.1-2: General test parameters for SA inter-frequency event triggered reporting with additional mandatory gap pattern

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	3	2	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	1	1	

Table A.6.6.2.9.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting with additional mandatory gap pattern

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configurati	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	

on	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD			
			Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
CORESET Reference Channel			Config 1	CR.1.1 FDD			
			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.1		SMTC.4	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS (Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz		-98		-98	
N_{oc} Note2		dBm/SCS	Config 1,2	-98		-98	
			Config 3	-95		-95	
SS-RSRP Note 3		dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
			Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2,3	4	4	-Infinity	7
Io Note3		dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26
		dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3	AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.9.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.10 SA event triggered reporting tests for FR1 when DRX is used

A.6.6.2.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE which supports interFrequencyMeas-Nogap-r16 makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search without measurement gap requirements in clause 9.3.9.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on RF channel 2. The SSB of cell 2 is completely within UE's active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters are given in Tables A.6.6.2.10.1-1, A.6.6.2.10.1-2 and A.6.6.2.10.1-3.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.10.1-1: SA event triggered reporting tests when DRX is used for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.10.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 when DRX is used

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1,2,3	1, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2	NR cell 2 is on NR RF channel number 2.
A3-Offset	dB	Config 1,2,3	-6	
Hysteresis	dB	Config 1,2,3	0	
CP length		Config 1,2,3	Normal	
TimeToTrigger	s	Config 1,2,3	0	
Filter coefficient		Config 1,2,3	0	L3 filtering is not used
DRX		Config 1,2,3	DRX.1	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs	Synchronous cells.
T1	s	Config 1,2,3	5	
T2	s	Config 1,2,3	1	

Table A.6.6.2.10.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 when DRX is used

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP		Config 1, 2, 3	ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		NA	
			Config 2	SR.1.1 TDD		NA	
			Config 3	SR2.1 TDD		NA	
CORESET Reference Channel			Config 1	CR.1.1 FDD		NA	
			Config 2	CR.1.1 TDD		NA	
			Config 3	CR2.1 TDD		NA	
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz	Config 1,2,3	-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						

Table A.6.6.2.10.1-4: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting when DRX is used

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.6.6.2.10.2 Test Requirements

In test config 1, UE is required to report SSB time index. UE is not required to report SSB time index. The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test config 2 and 3, UE is not required to report SSB time index. The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 900 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.11 SA event triggered reporting tests for FR1 without gap when DRX is not used

A.6.6.2.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.9.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The SSB of Cell 2 is completely within UE's active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters are given in Tables A.6.6.2.11.1-1, A.6.6.2.11.1-2 and A.6.6.2.11.1-3.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.11.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.2.11.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without gap

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1,2,3	1, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2	NR cell 2 is on NR RF channel number 2.
A3-Offset	dB	Config 1,2,3	-6	
Hysteresis	dB	Config 1,2,3	0	
CP length		Config 1,2,3	Normal	
TimeToTrigger	s	Config 1,2,3	0	
Filter coefficient		Config 1,2,3	0	L3 filtering is not used
DRX		Config 1,2,3	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs	Synchronous cells.
T1	s	Config 1,2,3	5	
T2	s	Config 1,2,3	1	

Table A.6.6.2.11.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without gap

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD			
			Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
CORESET Reference Channel			Config 1	CR.1.1 FDD			
			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							

EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz		-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						

A.6.6.2.11.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

The UE is not required to read the neighbour cell SSB index in this test.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.3 Inter-RAT Measurements

A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1

A.6.6.3.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.3.1.1-1. General test parameters are provided in Table A.6.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.1.1-3 and A.6.6.3.1.1-4, respectively.

Table A.6.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.6.3.1.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
LTE RF Channel Number		1	1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables A.6.6.3.1.1-2 and A.6.6.3.1.1-3.	
Active cell		Cell 1	Cell 1 is on RF channel number 1
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per-UE gap pattern.
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1
Inter-RAT E-UTRAN measurement quantity		RSRP	Measurement quantity for Cell 2
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-95	E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2
Hysteresis	dB	0	
TimeToTrigger	s	0	
Filter coefficient		0	L3 filtering is not used
DRX		OFF	OFF
T1	s	5	
T2	s	5	
Note 1: Values are defined in Table A.6.6.3.1.1-3			

Table A.6.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

Parameter		Unit	Configuration	Cell 1	
				T1	T2
RF channel number			1, 2, 3, 4, 5, 6	1	
Duplex mode			1, 2, 3	FDD	
			4, 5, 6	TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1	
	SCS=30 KHz		3, 6	TDDConf.2.1	
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)	
			2, 5	10: $N_{RB,c}$ = 52 (TDD)	
			3, 6	40: $N_{RB,c}$ = 106 (TDD)	
PDSCH reference measurement channel			1, 4	SR.1.1 FDD	
			2, 5	SR.1.1 TDD	
			3, 6	SR.2.1 TDD	
RMSI CORSET reference channel			1, 4	CR.1.1 FDD	
			2, 5	CR.1.1 TDD	
			3, 6	CR.2.1 TDD	
Dedicated CORSET reference channel			1, 4	CCR.1.1 FDD	
			2, 5	CCR.1.1 TDD	
			3, 6	CCR.2.1 TDD	
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1	
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.1	
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1	
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1	
OCNG pattern[Note1]			1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration			1, 2, 4, 5	SSB.1 FR1	
			3, 6	SSB.2 FR1	
CSI-RS for tracking			1, 4	TRS.1.1 FDD	
			2, 5	TRS.1.1 TDD	
			3, 6	TRS.1.2 TDD	
b2-Threshold1		dBm	1, 2, 4, 5	--96	
			3, 6	--93	
EPRE ratio of PSS to SSS		dB	1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N_{oc}[Note2]		dBm/15 KHz	1, 2, 3, 4, 5, 6	-104	
N_{oc}[Note2]		dBm/SCS	1, 2, 4, 5	-104	
			3, 6	-101	
$\hat{E}_s/N_{oc}$		dB	1, 2, 3, 4, 5, 6	116	70
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2, 3, 4, 5, 6	116	70
SS-RSRP[Note3]		dBm/SCS	1, 2, 4, 5	--88	--104
			3, 6	--85	--101
SSB_RP[Note3]		dBm/SCS	1, 2, 4, 5	--88	--104
			3, 6	--85	--101

Io[Note3]	dBm/9.36 MHz	1, 2, 4, 5	--59.94	--73.04
	dBm/38.16 MHz	3, 6	--53.84	--66.93
Propagation condition		1, 2, 3, 4, 5, 6	TDL-C 300ns 100Hz	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

Table A.6.6.3.1.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2	
			T1	T2

RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration^{Note1}		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel^{Note2}		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel^{Note2}		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns^{Note2}		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA^{Note3}				
OCNG_RB^{Note3}				
N_{oc}^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	17
$\hat{E}_s/I_{ot}$^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17
RSRP^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
SCH_RP^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
Io^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.3.2 SA NR - E-UTRAN event-triggered reporting in DRX in FR1

A.6.6.3.2.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indctated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle.

Supported test configurations are shown in table A.6.6.3.2.1-1. General test parameters are provided in Table A.6.6.3.2.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.2.1-3 and A.6.6.3.2.1-4, respectively.

Table A.6.6.3.2.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Test 1	Test 2	Comment
		Value		
NR RF Channel Number		1		1 NR carrier frequency is used in the test
LTE RF Channel Number		2		1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables A.6.6.3.2.1-2 and A.6.6.3.2.1-3.		
Active cell		Cell 1		Cell 1 is on RF channel number 1
Neighbour cell		Cell 2		Cell 2 is on RF channel number 2
Gap Pattern Id		0		As specified in Clause Table 9.1.2-1. Per-UE gap pattern.
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1
Inter-RAT E-UTRAN measurement quantity		RSRP		Measurement quantity for Cell 2
b2-Threshold1	dBm	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-95		E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2
Hysteresis	dB	0		
TimeToTrigger	s	0		
Filter coefficient		0		L3 filtering is not used
DRX		DRX.1	DRX. 7	DRX cycle configurations DRX.1 and DRX. 7 are defined in Table A.3.3.1-1 and Table A.3.3. 7-1 respectively.
T1	s	5		
T2	s	5	15	
Note 1: Values are defined in Table A.6.6.3.2.1-3				

Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

Parameter		Unit	Configuration	Cell 1	
				T1	T2
RF channel number			1, 2, 3, 4, 5, 6	1	
Duplex mode			1, 2, 3	FDD	
			4, 5, 6	TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1	
	SCS=30 KHz		3, 6	TDDConf.2.1	
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)	
			2, 5	10: $N_{RB,c}$ = 52 (TDD)	
			3, 6	40: $N_{RB,c}$ = 106 (TDD)	
PDSCH reference measurement channel			1, 4	SR.1.1 FDD	
			2, 5	SR.1.1 TDD	
			3, 6	SR.2.1 TDD	
RMSI CORSET reference channel			1, 4	CR.1.1 FDD	
			2, 5	CR.1.1 TDD	
			3, 6	CR.2.1 TDD	
Dedicated CORSET reference channel			1, 4	CCR.1.1 FDD	
			2, 5	CCR.1.1 TDD	
			3, 6	CCR.2.1 TDD	
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1	
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.1	
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1	
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1	
OCNG pattern[Note1]			1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration			1, 2, 4, 5	SSB.1 FR1	
			3, 6	SSB.2 FR1	
CSI-RS for tracking			1, 4	TRS.1.1 FDD	
			2, 5	TRS.1.1 TDD	
			3, 6	TRS.1.2 TDD	
b2-Threshold1		dBm	1, 2, 4, 5	-96	
			3, 6	-93	
EPRE ratio of PSS to SSS		dB	1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N_{oc}[Note2]		dBm/15 KHz	1, 2, 3, 4, 5, 6	-104	
N_{oc}[Note2]		dBm/SCS	1, 2, 4, 5	-104	
			3, 6	-101	
$\hat{E}_s/N_{oc}$		dB	1, 2, 3, 4, 5, 6	16	16
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2, 3, 4, 5, 6	16	16
SS-RSRP[Note3]		dBm/SCS	1, 2, 4, 5	-88	-88
			3, 6	-85	-85
SSB_RP[Note3]		dBm/SCS	1, 2, 4, 5	-88	-88
			3, 6	-85	-85

Io Note3	dBm/9.36 MHz	1, 2, 4, 5	-59.94	-59.94
	dBm/38.16 MHz	3, 6	-53.84	-53.84
Propagation condition		1, 2, 3, 4, 5, 6	TDL-C 300ns 100Hz	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

Table A.6.6.3.2.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2 T1	Cell 2 T2
RF channel number		1, 2, 3, 4, 5, 6	2	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration^Note1		4, 5, 6	6	
TDD uplink-downlink configuration^Note1		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel^Note2		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel^Note2		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns^Note2		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA^Note3				
OCNG_RB^Note3				
N_{oc}^Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	-Infinity
$\hat{E}_s/I_{ot}$^Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	-Infinity
RSRP^Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-Infinity
SCH_RP^Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-Infinity
Io^Note5	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log ($N_{RB,c}$ /50)	-76.22+10log ($N_{RB,c}$ /50)
Propagation Condition ^Note6		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix ^Note6		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral				

	density is achieved for all OFDM symbols.
Note 4:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.6.3.2.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 12.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.3.3 SA NR - E-UTRAN event-triggered reporting in DRX in FR1 for UE configured with highSpeedMeasFlag-r16

A.6.6.3.3.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements for UE configured with highSpeedMeasFlag-r16 in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In the test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

The UE shall be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle.

Supported test configurations are shown in table A.6.6.3.3.1-1. General test parameters are provided in Table A.6.6.3.3.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.3.1-3 and A.6.6.3.3.1-4, respectively.

Table A.6.6.3.3.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1 for UE configured with highSpeedMeasFlag-r16

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.6.3.3.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1 for UE configured with highSpeedMeasFlag-r16

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
LTE RF Channel Number		2	1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables A.6.6.3.3.1-2 and A.6.6.3.3.1-3.	
Active cell		Cell 1	Cell 1 is on RF channel number 1
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per-UE gap pattern.
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1
Inter-RAT E-UTRAN measurement quantity		RSRP	Measurement quantity for Cell 2
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-97	E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2
Hysteresis	dB	0	
TimeToTrigger	s	0	
Filter coefficient		0	L3 filtering is not used
DRX		DRX.6	DRX cycle configurations DRX.6 is defined in Table A.3.3.1-6.
T1	s	5	
T2	s	5	
Note 1: Values are defined in Table A.6.6.3.3.1-3			

Table A.6.6.3.3.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1 for UE configured with highSpeedMeasFlag-r16

Parameter		Unit	Configuration	Cell 1	
				T1	T2
RF channel number			1, 2, 3, 4, 5, 6	1	
Duplex mode			1, 2, 3	FDD	
			4, 5, 6	TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1	
	SCS=30 KHz		3, 6	TDDConf.2.1	
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)	
			2, 5	10: $N_{RB,c}$ = 52 (TDD)	
			3, 6	40: $N_{RB,c}$ = 106 (TDD)	
PDSCH reference measurement channel			1, 4	SR.1.1 FDD	
			2, 5	SR.1.1 TDD	
			3, 6	SR.2.1 TDD	
CORSET reference channel			1, 4	CR.1.1 FDD	
			2, 5	CR.1.1 TDD	
			3, 6	CR.2.1 TDD	
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1	
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.1	
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1	
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1	

OCNG pattern[Note1]		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration		1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration		1, 2, 4, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
b2-Threshold1	dBm	1, 2, 4, 5	-98	
		3, 6	-95	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS				
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
N_{oc}[Note2]	dBm/15 KHz	1, 2, 3, 4, 5, 6	-106	
N_{oc}[Note2]	dBm/SCS	1, 2, 4, 5	-106	
		3, 6	-103	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	18	-2
$\hat{E}_s/I_{ot}$[Note3]	dB	1, 2, 3, 4, 5, 6	18	-2
SS-RSRP[Note3]	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
SSB_RP[Note3]	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
Io[Note3]	dBm/9.36 MHz	1, 2, 4, 5	-59.98	-75.92
	dBm/38.16 MHz	3, 6	-53.88	-69.82
Propagation condition		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.3.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1 for UE configured with highSpeedMeasFlag-r16

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	2	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	

TDD special subframe configuration[Note1]		4, 5, 6	6
TDD uplink-downlink configuration[Note1]		4, 5, 6	1
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100
PDSCH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD
OCNG Patterns[Note2]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD

PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA Note3				
OCNG_RB Note3				
N_{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-106	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	19
$\hat{E}_s/I_{ot}$ Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	19
RSRP Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
SCH_RP Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
Io Note5	dBm/9MHz	1, 2, 3, 4, 5, 6	-78.22+10log ($N_{RB,c}$ /50)	-59.16+10log ($N_{RB,c}$ /50)
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWGN1944	
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.6.3.3.2 Test Requirements

In the test, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 4.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.4 L1-RSRP measurement for beam reporting

A.6.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.6.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.1.1-1.

Table A.6.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.4.1.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.1.2-1 and Table A.6.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		Off
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	s	5
T2	1~3	s	1
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			

Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
N_{oc} Note2	1~3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/SSB SCS	-94.65			
	3		-91.65			
$\hat{E}_s/I_{ot}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
	3		-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2\text{x}TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.6.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.2.1-1.

Table A.6.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.4.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.2.2-1 and Table A.6.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		DRX.3
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	s	5
T2	1~3	s	1
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			

Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.4.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
N_{oc} Note2	1~3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/SSB SCS	-94.65			
	3		-91.65			
$\hat{E}_s/I_{ot}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
	3		-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.6.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.3.1-1.

Table A.6.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.4.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.3.2-1 and Table A.6.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
CSI-RS configuration	1		CSI-RS 1.3 FDD
	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		Off
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0
			SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	8
T1	1~3	s	5
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS[Note 1]			

EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
N_{oc} Note1	1~3	dBm/15kHz	-94.65	
N_{oc} Note1	1,2	dBm/SSB SCS	-94.65	
	3		-91.65	
$\hat{E}_s/I_{ot}$	1~3	dB	0	3
CSI-RS RSRP Note2	1,2	dBm/SSB SCS	-94.65	-91.65
	3		-91.65	-88.65
Io Note2	1,2	dBm/9.36 MHz	-63.69	-61.93
	3	dBm/38.16 MHz	-57.59	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	3
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.6.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

A.6.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.4.1-1.

Table A.6.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.4.4.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.4.2-1 and Table A.6.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
CSI-RS configuration	1		CSI-RS 1.3 FDD
	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		DRX.3
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0
			SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	8
T1	1~3	s	5
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			

Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
N_{oc} Note1	1~3	dBm/15kHz	-94.65	
N_{oc} Note1	1,2	dBm/SSB SCS	-94.65	
	3		-91.65	
$\hat{E}_s/I_{ot}$	1~3	dB	0	3
CSI-RS RSRP Note2	1,2	dBm/SSB SCS	-94.65	-91.65
	3		-91.65	-88.65
Io Note2	1,2	dBm/9.36 MHz	-63.69	-61.93
	3	dBm/38.16 MHz	-57.59	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	3
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.6.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.5 SSB based L1-RSRP measurement when DRX is used for UE configured with *highSpeedMeasFlag-r16*

A.6.6.4.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement when UE is configured with *highSpeedMeasFlag-r16*. This test will partly verify the L1-RSRP measurement requirements for UE configured with *highSpeedMeasFlag-r16* in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.5.1-1.

Table A.6.6.4.5.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.4.5.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.5.2-1 and Table A.6.6.4.5.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.5.2-1: General test parameters for UE configured with *highSpeedMeasFlag-r16*

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD

DRX configuration	1~3		DRX.8
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	s	5
T2	1~3	s	2
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN 1944 Hz
	3		AWGN 3334 Hz
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.4.5.2-2: SSB specific test parameters for UE configured with *highSpeedMeasFlag-r16*

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
N_{oc} Note2	1~3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/SSB SCS	-94.65			
	3		-91.65			
$\hat{E}_s/I_{ot}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
	3		-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

A.6.6.4.5.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than [1920ms] plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.5

A.6.6.5.1 SA NR - UTRAN FDD event-triggered reporting in non-DRX in FR1

A.6.6.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT UTRAN FDD measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clause 9.4.6.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT UTRAN FDD neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.5.1.1-1. General test parameters are provided in Table A.6.6.5.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.5.1.1-3 and A.6.6.5.1.1-4, respectively.

Table A.6.6.5.1.1-1: Supported test configurations in SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, UTRA FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, UTRA FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, UTRA FDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.6.5.1.1-2: General test parameters for SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
UTRA RF Channel Number		1	1 UTRA carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables A.6.6.5.1.1-2 and A.6.6.5.1.1-3.	
Active cell		Cell 1	Cell 1 is on RF channel number 1
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per-UE gap pattern.
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1
Inter-RAT UTRA measurement quantity		CPICH Ec/Io	Measurement quantity for Cell 2
b1-Threshold2UTRA	dB	-16.5	CPICH Ec/Io threshold for SS-RSRP measurement on cell1 for event B1
Hysteresis	dB	0	
TimeToTrigger	s	0	
Filter coefficient		0	L3 filtering is not used
DRX		OFF	OFF
T1	s	5	
T2	s	5	
Note 1: Values are defined in Table A.6.6.5.1.1-3			

Table A.6.6.5.1.1-3: PCell specific test parameters for SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

Parameter		Unit	Configuration	Cell 1	
				T1	T2
RF channel number			1, 2, 3	1	
Duplex mode			1, 2, 3	FDD	
TDD Configuration	SCS=15 KHz		2	TDDConf.1.1	
	SCS=30 KHz		3	TDDConf.2.1	
$BW_{channel}$		MHz	1	10: $N_{RB,c}$ = 52 (FDD)	
			2	10: $N_{RB,c}$ = 52 (TDD)	
			3	40: $N_{RB,c}$ = 106 (TDD)	
PDSCH reference measurement channel			1	SR.1.1 FDD	
			2	SR.1.1 TDD	
			3	SR.2.1 TDD	
CORSET reference channel			1	CR.1.1 FDD	
			2	CR.1.1 TDD	
			3	CR.2.1 TDD	
BWP configurations	Initial DL BWP		1, 2, 3	DLBWP.0.1	
	Dedicated DL BWP		1, 2, 3	DLBWP.1.1	
	Initial UL BWP		1, 2, 3	ULBWP.0.1	
	Dedicated UL BWP		1, 2, 3	ULBWP.1.1	
OCNG pattern^{Note1}			1, 2, 3	OP.1	
SMTC configuration			1, 2, 3	SMTC.1	
SSB configuration			1, 2	SSB.1 FR1	
			3	SSB.2 FR1	
b2-Threshold1		dBm	1, 2	-98	
			3	-95	
CSI-RS for tracking			1	TRS.1.1 FDD	
			2	TRS.1.1 TDD	
			3	TRS.1.2 TDD	
EPRE ratio of PSS to SSS		dB	1, 2, 3	0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N_{oc}^{Note2}		dBm/15 KHz	1, 2, 3	-106	
N_{oc}^{Note2}		dBm/SCS	1, 2	-106	
			3	-103	
$\hat{E}_s/N_{oc}$		dB	1, 2, 3	18	-2
$\hat{E}_s/I_{ot}$^{Note3}		dB	1, 2, 3	18	-2
SS-RSRP^{Note3}		dBm/SCS	1, 2	-88	-108
			3	-85	-105
SSB_RP^{Note3}		dBm/SCS	1, 2	-88	-108
			3	-85	-105
Io^{Note3}		dBm/9.36 MHz	1, 2	-59.98	-75.92
		dBm/38.16	3	-53.88	-69.82

	MHz			
Propagation condition		1, 2, 3	ETDLA30	
Antenna Configuration and Correlation Matrix		1, 2, 3	1x2 Low	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

Table A.6.6.5.1.1-4: UTRAN neighbour cell specific test parameters for SA inter-RAT UTRAN FDD event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Cell 2	
		T1	T2
UTRA RF Channel Number		1	
CPICH_Ec/Ior	dB	-10	
PCCPCH_Ec/Ior	dB	-12	
SCH_Ec/Ior	dB	-12	
PICH_Ec/Ior	dB	-15	
DPCH_Ec/Ior	dB	N/A	
OCNS		-0.941	
$\hat{I}_{or}/I_{oc}$	dB	-Infinity	-1.8
I_{oc}	dBm/3.84 MHz	-70	
CPICH_Ec/Io	dB	-Infinity	-14
Propagation Condition		AWGN	
Note 1: The DPCH level is controlled by the power control loop. Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to I_{or}.			

A.6.6.5.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 2.4s from the start of period T2, i.e. when Cell 2 becomes detectable. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.6 CLI measurements

A.6.6.6.1 SRS-RSRP measurement with DRX

A.6.6.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of SRS-RSRP measurement. This test will verify the SRS-RSRP measurement requirements in clause 9.7.2.5 with the testing configurations for NR cells in Table A.6.6.6.1.1-1.

Table A.6.6.6.1.1-1: Applicable NR configurations for FR1 SRS-RSRP test

Configuration	Description
1	NR 15 kHz SRS SCS, 10 MHz bandwidth, TDD duplex mode
2	NR 30 kHz SRS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.6.1.2 Test Parameters

One cell is deployed in the test, which is FR1 PCell (Cell 1). The test parameters for PCell is given in Table A.6.6.6.1.2-1 and A.6.6.6.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event I1 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively.

During the test, the test system transmits SRS resource for measurement in the DL slot according to the SRS configuration in Table A.6.6.6.1.2-4 and the test parameters for the (virtual) neighbour cell UE in Table A. 6.6.6.1.2-3. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on SRS symbol to be transmitted and on 1 data symbol before SRS to be transmitted.

Table A.6.6.6.1.2-1: General test parameters for SRS-RSRP event triggered reporting for PCell in FR1

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2	Cell 1	
RF Channel Number		1, 2	1: Cell 1	
SSB configuration		1	SSB.1 FR1	
		2	SSB.2 FR1	
SMTC configuration		1	SMTC.1	
		2	SMTC.1	
SRS configuration		1	SRSConf.1	Table A.6.6.6.1.2-3
		2	SRSConf.2	
CP length		1, 2	Normal	
i1-Threshold	dBm	1	-97	
		2	-95	
Hysteresis	dB	1, 2	0	
Time To Trigger	s	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	DRX.7	
Time offset between DL from serving cell and SRS from test system	μs	1,2	17.67	
T1	s	1, 2	5	
T2	s	1, 2	5	

Table A.6.6.6.1.2-2: NR Cell specific test parameters for SRS-RSRP event triggered reporting for PCell in FR1

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1	TDDConf.1.1	
		2	TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 TDD	
		2	SR.2.1 TDD	
RMSI CORESET RMC configuration		1	CR.1.1 TDD	
		2	CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 TDD	
		2	CCR.2.1 TDD	
OCNG Patterns		1, 2	OP.1	
TRS Configuration		1	TRS.1.1 TDD	
		2	TRS.1.2 TDD	
Initial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBWP.1.1	
N_{oc} Note 2	dBm/15 kHz	1	-98	
		2		
N_{oc} Note 2	dBm/SCS	1	-98	
		2	-95	
Propagation Condition		1, 2	AWGN	
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				

Table A.6.6.6.1.2-3: NR Cell specific test parameters for SRS-RSRP event triggered reporting for neighbour cell UE

Parameter	Unit	Test configuration	Neighbour cell UE	
			T1	T2
N_{oc} Note 2	dBm/15 kHz	1	-98	
		2		
N_{oc} Note 2	dBm/SCS	1	-98	
		2	-95	
$\hat{E}_s/I_{ot}$	dB	1	-infinity	4
		2		
$\hat{E}_s/N_{oc}$	dB	1	-infinity	4
		2		
SRS-RSRP Note 3	dBm/SCS kHz	1	-infinity	-94
		2	-infinity	-91
Io	dBm/9.36 MHz	1	-70.05	-64.59
	dBm/38.16 MHz	2	-63.96	-58.50
Propagation Condition		1, 2	AWGN	
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

Table A.6.6.6.1.2-4: SRS configuration for measurement reporting

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-ResourceId	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	12	12	
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset	sl640, 4	sl640, 9	
	sequenceId	0	0	Any 10 bit number

A.6.6.6.1.3 Test Requirements

The UE shall send one Event I1 triggered measurement report, with a measurement reporting delay less than 1920 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.6.2 CLI-RSSI measurement with DRX

A.6.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of CLI-RSSI measurement. This test will verify the CLI-RSSI measurement requirements in clause 9.7.3.5 with the testing configurations for NR cells in Table A.6.6.6.2.1-1.

Table A.6.6.6.2.1-1: Applicable NR configurations for FR1 CLI-RSSI test

Configuration	Description
1	NR 15 kHz SCS, 10 MHz bandwidth, TDD duplex mode
2	NR 30 kHz SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.6.2.2 Test Parameters

One cell is deployed in the test, which are FR1 PCell (Cell 1). The test parameters for PCell is given in Table A.6.6.6.2.2-1 and A.6.6.6.2.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event I1 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively.

During the test, the test system does not transmit PDCCH/PDSCH/OCNG on symbols for CLI-RSSI measurement resource and on 1 data symbol before. The CLI-RSSI measurement resource configuration is in Table A.6.6.6.2.2-3.

Table A.6.6.6.2.2-1: General test parameters for CLI-RSSI event triggered reporting for PCell in FR1

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2	NR Cell 1	
RF Channel Number		1, 2	1: Cell 1	
SSB configuration		1	SSB.1 FR1	
		2	SSB.2 FR1	
SMTC configuration		1	SMTC.1	
		2	SMTC.1	
CLI-RSSI configuration		1	CLI-RSSIConf.1	Table A.6.6.6.2.2-3
		2	CLI-RSSIConf.2	
CP length		1, 2	Normal	
i1-Threshold	dBm	1	-93	
		2	-93	
Hysteresis	dB	1, 2	0	
Time To Trigger	s	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	DRX.7	
Time offset between DL from serving cell and OCNG from test system	µs	1,2	17.67	
T1	s	1, 2	5	
T2	s	1, 2	2	

Table A.6.6.6.2.2-2: NR Cell specific test parameters for CLI-RSSI event triggered reporting for PCell in FR1

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1	TDDConf.1.1	
		2	TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 TDD	
		2	SR.2.1 TDD	
PUSCH parameters		1	N/A	
		2		
RMSI CORESET RMC configuration		1	CR.1.1 TDD	
		2	CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 TDD	
		2	CCR.2.1 TDD	
OCNG Patterns Note 3		1, 2	OP.1	
TRS Configuration		1	TRS.1.1 TDD	
		2	TRS.1.2 TDD	
Initial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBWP.1.1	
N_{oc} on CLI-RSSI measurement resource Note 2	dBm/15 kHz	1	-116	-108
		2		
N_{oc} on CLI-RSSI measurement resource Note 2	dBm/SCS	1	-116	-108
		2	-113	-105
Io on CLI-RSSI measurement resource	dBm/9.36 MHz	1	-88.05	-80.05
	dBm/38.16 MHz	2	-81.96	-74.00
Io on CLI-RSSI measurement resource	dBm/1.08 MHz	1	-97.43	-89.43
	dBm/1.08 MHz	2	-97.44	-89.44
Propagation Condition		1, 2	AWGN	
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: OCNG is not transmitted in the CLI-RSSI measurement resources.				

Table A.6.6.6.2.2-3: CLI-RSSI measurement resource configuration for measurement reporting

	Field	CLI-RSSIConf.1	CLI-RSSIConf.2
RSSI-Resource	rssi-ResourceId	0	0
	rssi-SCS	15	30
	startPRB	0	0
	nrofPRBs	52	106
	startPosition	3	3
	nrofSymbols	11	11
	rssi-PeriodicityAndOffset	sl640, 4	sl640, 9

A.6.6.6.2.3 Test Requirements

The UE shall send one Event I1 triggered measurement report, with a measurement reporting delay less than 640 ms from the beginning of time period T2. The nominal RSSI used to evaluate the requirement shall be based on Io.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.7 NR measurements with autonomous gaps

A.6.6.7.1 SA intra-frequency CGI identification of NR neighbor cell in FR1

A.6.6.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of intra-frequency CGI identification of an NR neighbour cell in FR1 with autonomous gaps. This test shall partly verify the measurement requirements in Clause 9.11.

A.6.6.7.1.2 Test Parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the FR1 PCell and Cell 2 is an FR1 neighbour cell on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.7.1.1-2 and A.6.6.7.1.3-2 below. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable. A measurement object is configured for the frequency of the PCell and it is indicated to the UE that event-triggered reporting with Event A3 is used. The UE is expected to detect and send a measurement report with Event A3.

A new RRC message triggering CGI identification shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *useAutonomousGaps* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying CGI identification is sent to the UE.

The test equipment verifies that potential interruption is carried out correctly by monitoring ACK/NACK sent in PCell during T3 untill a measurement report with CGI is sent.

Table A.6.6.71.1.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.7.1.2-2: General test parameters for SA intra-frequency CGI identification of NR neighbor cell in FR1

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	s	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	5	
T2	s	1, 2, 3	5	

Table A.6.6.7.1.2-3: NR Cell specific test parameters for SA intra-frequency CGI identification of NR neighbor cell in FR1

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	--64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	--58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.7.1.3 Test Requirements

The UE shall send a measurement report containing the CGI of cell 2 within 252 ms from the start of time period T3.

Test requirement = RRC Procedure delay + $T_{identify\_CGI}$ + reporting delay

= 10 + 240 + 2ms from the start of T3

= 252 ms

The UE shall be scheduled continuously throughout the test. From the start of T3 until 252 ms, the interruption on PCell shall not be more than the values specified for SA in clause 8.2.2.2.14.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.7.2 Identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR SA

A.6.6.7.2.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in NR SA in clause 9.4.7.

The test scenario comprises of one NR carrier and an E-UTRA carrier and two cells as given in tables A.6.6.7.2.1-1, A.6.6.7.2.1-2, A.6.6.7.2.1-3 and A.6.6.7.2.1-4. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

Table A.6.6.7.2.1-1: Supported test configurations of inter-RAT E-UTRAN cell using autonomous gap in SA

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.6.7.2.1-2: General test parameters for identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
LTE RF Channel Number		2	1 LTE carrier frequency is used in the test
Active cell		Cell 1	
Neighbour cell		Cell 2	Cell to be identified.
LTE Channel Bandwidth	MHz	10	
LTE PDSCH/PCFICH/PDCCH/PHICH parameters			As specified in clause A.3.7.2.1
CP length		Normal	
A3-Offset	dB	-3	
Hysteresis	dB	0	
Time To Trigger	s	0	
Filter coefficient		0	L3 filtering is not used
DRX		OFF	
si-RequestForHO		TRUE	As specified in clause 5.5.3.1 in TS 36.331.
Time offset between cells	ms	3	Asynchronous cells
T1	s	5	
T2	s	≤10	
T3	s	5	

Table A.6.6.7.2.1-3: PCell specific test parameters for identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR

Parameter		Unit	Configuration	Cell 1		
				T1	T2	T3
RF channel number			1, 2, 3, 4, 5, 6	1		
Duplex mode			1, 2, 3	FDD		
			4, 5, 6	TDD		
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1		
	SCS=30 KHz		3, 6	TDDConf.2.1		
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)		
			2, 5	10: $N_{RB,c}$ = 52 (TDD)		
			3, 6	40: $N_{RB,c}$ = 106 (TDD)		
PDSCH reference measurement channel			1, 4	SR.1.1 FDD		
			2, 5	SR.1.1 TDD		
			3, 6	SR.2.1 TDD		
CORSET reference channel			1, 4	CR.1.1 FDD		
			2, 5	CR.1.1 TDD		
			3, 6	CR.2.1 TDD		
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1		
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.1		
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1		
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1		
OCNG pattern[Note1]			1, 2, 3, 4, 5, 6	OP.1		
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration			1, 2, 4, 5	SSB.1 FR1		
			3, 6	SSB.2 FR1		
b2-Threshold1		dBm	1, 2, 4, 5	-98		
			3, 6	-95		
EPRE ratio of PSS to SSS		dB	1, 2, 3, 4, 5, 6	0		
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						

EPRE ratio of PDCCH to PDCCH_DMRS				
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
N_{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-106	
N_{oc} Note2	dBm/SCS	1, 2, 4, 5	-106	
		3, 6	-103	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	18	-2
$\hat{E}_s/I_{ot}$ Note3	dB	1, 2, 3, 4, 5, 6	18	-2
SS-RSRP Note3	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
SSB_RP Note3	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
Io Note3	dBm/9.36 MHz	1, 2, 4, 5	-59.98	-75.92
	dBm/38.16 MHz	3, 6	-53.88	-69.82
Propagation condition		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

Table A.6.6.7.2.1-4: Cell specific test parameters for inter-RAT E-UTRAN cell for identification of a new CGI of E-UTRA cell using autonomous gaps

Parameter	Unit	Configuration	Cell 2		
			T1	T2	T3
RF channel number		1, 2, 3, 4, 5, 6	2		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration Note1		4, 5, 6	6		
TDD uplink-downlink configuration Note1		4, 5, 6	1		
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	10 MHz: $N_{RB,c}$ = 50		
PDSCH parameters: DL Reference Measurement Channel Note2		1, 2, 3	10 MHz: R.3 FDD		
		4, 5, 6	10 MHz: R.0 TDD		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel Note2		1, 2, 3	10 MHz: R.6 FDD		
		4, 5, 6	10 MHz: R.6 TDD		
OCNG Patterns Note2		1, 2, 3	10 MHz: OP.10 FDD		
		4, 5, 6	10 MHz: OP.1 TDD		
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0		
PBCH_RB					
PSS_RA					

SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA Note3					
OCNG_RB Note3					
N_{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-106		
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7	7
$\hat{E}_s/I_{ot}$ Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	7	7
RSRP Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-99	-99
SCH_RP Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-99	-99
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low		
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					

A.6.6.7.2.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 200 milliseconds from the start of T3.

Test requirement = RRC Procedure delay with additional margin + $T_{identify\_CGI,E\text{-}UTRAN}$ + reporting delay

= 15 + 30 + 150 + 2ms from the start of T3

= 197 ms, allow 200 ms.

- The UE shall be scheduled continuously throughout the test, and from the start of T3 until 200 ms at least the following number of ACK/NACK shall be detected as being transmitted by the UE.Config 1, 2, 4, 5: 80 ACK/NACK
- Config 3, 6: 160 ACK/NACK

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

NOTE: The overall ACK/NACK number is caused by two parts. Firstly, at least 60/120 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 9.4.7.1. Secondly, given that continuous DL data allocation, additional 20/40 ACK/NACK shall be sent from the start of T3 until 200 ms excludes 150 ms for identifying the cell global identifier of cell 2.

A.6.6.8 L1-SINR measurement for beam reporting

A.6.6.8.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured when DRX is used

A.6.6.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.1, with the testing configurations for NR cells in Table A.6.6.8.1.1-1.

Table A.6.6.8.1.1-1: Applicable NR configurations for FR1 CSI-RS based L1-SINR test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.8.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.8.2-1 and Table A.6.6.8.2-2 below.

In the CSI-RS measurement configuration, UE is indicated to perform L1-SINR measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.8.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.8.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD

SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
CSI-RS configuration	1		CSI-RS 1.2 FDD
	2		CSI-RS 1.2 TDD
	3		CSI-RS 2.2 TDD
OCNG Patterns	1~3		OP.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		DRX.3
reportConfigType	1~3		aperiodic
reportQuantity-r16	1~3		cri-SINR-r16
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0
			SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	26
T1	1~3	s	5
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.8.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
N_{oc} Note1	1~3	dBm/15kHz	-94.65	
N_{oc} Note1	1,2	dBm/SSB SCS	-94.65	
	3		-91.65	
$\hat{E}_s/I_{ot}$	1~3	dB	0	3
CSI-RS RSRP Note3	1,2	dBm/SSB SCS	-94.65	-91.65
	3			

			-91.65	-88.65
Io [Note2]	1,2	dBm/9.36 MHz	-63.69	-61.93
	3	dBm/38.16 MHz	-57.59	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	3
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.6.6.8.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.27.1.1 and relative accuracy requirement in clause 10.1.27.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI$_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.8.2 L1-SINR measurement with SSB based CMR and dedicated IMR when DRX is not used

A.6.6.8.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.2, with the testing configurations for NR cells in Table A.6.6.8.2.1-1.

Table A.6.6.8.2.1-1: Applicable NR configurations for FR1 L1-SINR measurement test with SSB based CMR and CSI-RS based IMR

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.6.6.8.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.8.2.2-1 and Table A.6.6.8.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the SSBs and the associated CSI-RS resources, and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD measurements based on the SSBs, and UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-RS resources as IMR.

Table A.6.6.8.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	c		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
CSI-RS configuration	1		CSI-RS 1.1A FDD
	2		CSI-RS 1.1A TDD
	3		CSI-RS 2.1A TDD
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		off
reportConfigType	1~3		periodic
reportQuantity-r16	1~3		ssb-Index-SINR-r16
Number of reported RS	1~3		2
L1-SINR reporting period	1~3	slot	80
T1	1~3	s	5
T2	1~3	s	1
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to			

SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.6.6.8.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
N_{oc} Note2	1~3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/SSB SCS	-94.65			
	3		-91.65			
$\hat{E}_s/I_{ot}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
	3		-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.8.2.2-3: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0		CSI-RS#1	
			T1	T2	T1	T2
N_{oc} Note2	1~3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/CSI-RS SCS	-94.65			
	3		-91.65			
$\hat{E}_s/I_{ot}$	1~3	dB	0	0	-Infinity	3
CSI-RS RSRP Note3	1,2	dBm/CSI-RS SCS	-94.65	-94.65	-Infinity	-91.65
	3		-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.8.2.3 Test Requirements

The UE shall send L1-SINR report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-SINR report including results of both SSB#0+CSI-RS#0 and SSB#1+CSI-RS#1 while meeting the accuracy requirement in clause 10.1.27.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.8.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR configured when DRX is not used

A.6.6.8.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements with CSI-RS based CMR and dedicated IMR cofigured in clause 9.8.4.3, with the testing configurations for NR cells in Table A.6.6.8.3.1-1.

Table A.6.6.8.3.1-1: Applicable NR configurations for FR1 L1-SINR test with CMR and dedicated IMR

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Note: The UE is only required to be tested in one of the supported test configurations

A.6.6.8.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.8.3.2-1 and Table A.6.6.8.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the configured CSI-RS as CMR and an associated CSI-IM as IMR, and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources. UE is also configured to measure L1-SINR based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.8.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs, and UE is configured to perform L1-SINR measurement based on the CSI-RS as CMR and the CSI-IM as IMR.

Table A.6.6.8.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
Duplex mode	1		FDD
	2		TDD
	3		TDD
TDD Configuration	1		N/A
	2		TDDConf.1.1
	3		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD
	2		SR.1.1 TDD
	3		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD
	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD
	2		CCR.1.1 TDD
	3		CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1
	2		SSB.3 FR1
	3		SSB.4 FR1
CSI-RS configuration	1		CSI-RS 1.3 FDD
	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
CSI-IM configuration	1		CSI-IM.1.2 FDD
	2		CSI-IM.1.2 TDD
	3		CSI-IM.2.2 TDD
OCNG Patterns	1~3		OP.1
TRS Configuration	1		TRS.1.1 FDD
	2		TRS.1.1 TDD
	3		TRS.1.2 TDD

Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		Off
reportConfigType	1~3		aperiodic
reportQuantity-r16	1~3		cri-SINR-r16
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	26
T1	1~3	s	5
EPRE ratio of PSS to SSS	1~3	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

A.6.6.8.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
N_{oc} Note1	1~3	dBm/15kHz	-94.65	
N_{oc} Note1	1,2	dBm/SSB SCS	-94.65	
	3		-91.65	
$\hat{E}_s/I_{ot}$	1~3	dB	0	3
CSI-RS RSRP Note2	1,2	dBm/SSB SCS	-94.65	-91.65
	3		-91.65	-88.65
Io Note2	1,2	dBm/9.36 MHz	-63.69	-61.93
	3	dBm/38.16 MHz	-57.59	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	3
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.6.6.8.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 as CMR + CSI-IM#0 as IMR and CSI-RS#1 as CMR + CSI-IM#1 as IMR while meeting the accuracy requirement in clause 10.1.27.3.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.9 Idle Mode CA/DC Measurements

A.6.6.9.1 SA Idle mode CA/DC measurement for FR1

A.6.6.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the required measurements on the serving cell and the configured inter-frequency carrier for idle mode measurement reporting after the UE has entered Idle mode. This test will partly verify the Idle mode CA/DC measurements requirements in clause 4.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.9.1.1-1, A.6.6.9.1.1-2, A.6.6.9.1.1-3 and A.6.6.9.1.1-4.

The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. Druing T1, the UE is connected to cell 1 only and shall not have any timing information of cell 2. UE is configured with early measurement reporting with channel 2. Beam level reporting for early measurements is not configured. The connection is released at the end of T1. T2 starts when the connection is released. During the time periods T2 UE is in Idle mode. At T3 the UE is paged for connection setup and requested by the network to send idle mode measurements.

Table A.6.6.9.1.1-1: supported test configuration

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.9.1.1-2: General test parameters for SA Idle mode CA/DC measurement for FR1

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1,2,3	1, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2	NR cell 2 is on NR RF channel number 2.
SMTC-SSB parameters		Config 1	SSB.1 FR1	As specified in clause A.3.10.1
		Config 2	SSB.1 FR1	As specified in clause A.3.10.1
		Config 3	SSB.2 FR1	As specified in clause A.3.10.1
Hysteresis	dB	Config 1,2,3	0	
PRACH configuration index		Config 1,2,3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
CP length		Config 1,2,3	Normal	
TimeToTrigger	s	Config 1,2,3	0	
Filter coefficient		Config 1,2,3	0	L3 filtering is not used
DRX in connected mode		Config 1,2,3	OFF	DRX is not used
DRX in idle mode	s	Config 1,2,3	[0.32]	The value shall be used for all cells in the test.
T331	s		300	
Time offset between serving and neighbour cells		Config 1	3ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs	Synchronous cells.
T1	s	Config 1,2,3	10	
T2	s	Config 1,2,3	[11.52]	
T3	s	Config 1,2,3	10	

Table A.6.6.9.1.1-3: Cell specific test parameters for connected mode for SA Idle mode CA/DC measurement for FR1

Parameter		Unit	Test configuration	Cell 1			Cell 2		
				T1	T2	T3	T1	T2	T3
NR RF Channel Number			Config 1,2,3	1			2		
Duplex mode			Config 1	FDD					
			Config 2,3	TDD					
TDD configuration			Config 1	Not Applicable					
			Config 2	TDDConf.1.1					
			Config 3	TDDConf.2.1					
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52					
			Config 3	40: $N_{RB,c}$ = 106					
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52					
			Config 3	40: $N_{RB,c}$ = 106					
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1			NA		
	Initial UL BWP			ULBWP.0.1			NA		
	Dedicated DL BWP			DLBWP.1.1			NA		
	Dedicated UL BWP			ULBWP.1.1			NA		
TRS configuration			Config 1	TRS.1.1 FDD			NA		
			Config 2	TRS.1.1 TDD			NA		
			Config 3	TRS.1.2 TDD			NA		
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1			OP.1		
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD			SR.1.1 FDD		
			Config 2	SR.1.1 TDD			SR.1.1 TDD		
			Config 3	SR2.1 TDD			SR2.1 TDD		
CORESET Reference Channel			Config 1	CR.1.1 FDD			CR.1.1 FDD		
			Config 2	CR.1.1 TDD			CR.1.1 TDD		
			Config 3	CR2.1 TDD			CR2.1 TDD		
SSB parameters			Config 1	SSB.1 FR1			SSB.5 FR1		
			Config 2	SSB.1 FR1			SSB.5 FR1		
			Config 3	SSB.2 FR1			SSB.6 FR1		
SMTC configuration defined in A.3.11			Config 1	SMTC.2			SMTC.5		
			Config 2, 3	SMTC.1			SMTC.4		
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15					
			Config 3	30					
EPRE ratio of PSS to SSS			Config 1,2,3	0			0		
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									

EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
N_{oc} Note2	dBm/15 kHz		-98			-98		
N_{oc} Note2	dBm/SCS	Config 1,2	-98			-98		
		Config 3	-95			-95		
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-91	-infinity	-98	-98
		Config 3	-88	-88	-88	-infinity	-95	-95
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3,4,5,6	7	7	7	-infinity	0	0
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	7	7	7	infinity	0	0
Io Note3	dBm/9.36MHz	Config 1,2	-62.26	-62.26	-62.26	-70.5	-67.04	-67.04
	dBm/38.16MHz	Config 3	-56.15	-56.15	-56.15	-63.94	-60.93	-60.93
Propagation Condition		Config 1,2,3	AWGN			AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.								

Table A.6.6.9.1.1-4: Cell specific test parameters for idle mode for SA Idle mode CA/DC measurement for FR1

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
NR RF Channel Number		1,2,3	1			2		
TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD		
		2	SR.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 FDD		
		2	CR.1.1 TDD			CR.1.1 TDD		
		3	CR.2.1 TDD			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 FDD		
		2	CCR.1.1 TDD			CCR.1.1 TDD		
		3	CCR.2.1 TDD			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2, 3	SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2	-140			-140		
		3	-137			-137		
Pcompensation	dB	1, 2, 3	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	[14]	[14]	[14]	-infinity	[12]	[12]
		2						
		3						
N_{oc} Note2	dBm/SCS	1	[-98]					
		2	[-98]					
		3	[-95]					
N_{oc} Note2	dBm/15 kHz	1	[-98]					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	[7]	[7]	[7]	-infinity	[0]	[0]
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	[-91]	[-91]	[-91]	-infinity	[-98]	[-98]
		2	[-91]	[-91]	[-91]	-infinity	[-98]	[-98]
		3	[-88]	[-88]	[-88]	-infinity	[-95]	[-95]
Io	dBm/9.36 MHz	1	[-62.26]	[-62.26]	[-62.26]	[-70.5]	[-67.04]	[-67.04]
	dBm/9.36 MHz	2	[-62.26]	[-62.26]	[-62.26]	[-70.5]	[-67.04]	[-67.04]
	dBm/38.16 MHz	3	[-56.15]	[-56.15]	[-56.15]	[-63.94]	[-60.93]	[-60.93]
Treselection	s	1, 2, 3	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2, 3	Not sent			Not sent		
Propagation Condition		1, 2, 3	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.9.1.2 Test Requirements

The UE behaviour during time durations T2 and T3 shall be as follows:

During the time period T2 the UE is in Idle mode and the signal level of cell 2 is changed. The UE shall not perform reselection. The UE shall perform Idle Mode CA measurement according to Section 4.4.

At the start of T3 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report for cell 2. The UE shall send early measurement report to the PCell.

After receiving the requested early measurement report, the test equipment verifies the accuracy of measurement reported for Cell 2 meets the requirements in Section 10.X and test ends.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.10 CSI-RS based intra-frequency Measurements

A.6.6.10.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.10.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA CSI-RS based L3 intra-frequency requirements in clauses 9.10.2.

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.10.1.1-1 and A.6.6.10.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.10.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.6.6.10.1.1-2: General test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified and measured.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS configuration for RRM		1	CSI-RS.RRM.FR1.1 FDD	
		2	CSI-RS.RRM.FR1.1 TDD	
		3	CSI-RS.RRM.FR1.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	s	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between serving and neighbour cells	μs	1	4.7	Asynchronous cells. The timing of Cell 2 is CP later than the timing of Cell 1.
		2	4.7	Synchronous cells
		3	2.35	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	1	

Table A.6.6.10.1.1-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		CR.1.1 FDD	
		2	CR.1.1 TDD		CR.1.1 TDD	
		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 FDD	
		2	CCR.1.1 TDD		CCR.1.1 TDD	
		3	CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD		N/A	
		3	TRS.1.2 TDD		N/A	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
CSI-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	--64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	--58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: CSI-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.10.1.2 Test Requirements

In this test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.11 CSI-RS based inter-frequency Measurements

A.6.6.11.1 SA event triggered reporting tests with gap under DRX

A.6.6.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA CSI-RS based L3 inter-frequency measurement requirements in clause 9.10.3.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.11.1.1-1, A.6.6.11.1.1-2 and A.6.6.11.1.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.11.1.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.11.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.11.1.1-1: SA event triggered reporting tests for FR1-FR1

Config	Description
1	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell	

Table A.6.6.11.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	DRX.5	DRX.5	As specified in clause A.3.3
Time offset between serving and neighbour cells	μs	Config 1	4.7		Asynchronous cells. The timing of Cell 2 is CP later than the timing of Cell 1.
		Config 2	4.7		Synchronous cells.
		Config 3	2.35		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	10	10	

Table A.6.6.11.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD			
			Config 2,3	TDD			
TDD configuration			Config 1	Not Applicable			
			Config 2	TDDConf.1.1			
			Config 3	TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1, 2, 3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.1 FDD		NA	
			Config 2	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD			
			Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
SSB parameters			Config 1	SSB.1 FR1		SSB.5 FR1	
			Config 2	SSB.1 FR1		SSB.5 FR1	
			Config 3	SSB.2 FR1		SSB.6 FR1	
SMTC configuration defined in A.3.11			Config 1	SMTC.2		SMTC.5	
			Config 2, 3	SMTC.1		SMTC.4	
CSI-RS configuration for RRM			Config 1	CSI-RS.RRM.FR1.1 FDD		CSI-RS.RRM.FR1.1 FDD	
			Config 2	CSI-RS.RRM.FR1.1 TDD		CSI-RS.RRM.FR1.1 TDD	
			Config 3	CSI-RS.RRM.FR1.2 TDD		CSI-RS.RRM.FR1.2 TDD	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15			
			Config 3	30			
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz		-98		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	-98		-98	
		Config 3	-95		-95	
CSI-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
SS-RSRP Note 3	dBm/SCS	Config 1,2	-94	-94	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						

A.6.6.11.1.2 Test Requirements

In test 1 with per-UE gap and test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 9280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.12 RSTD measurements

A.6.6.12.1 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR1 SA

A.6.6.12.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations are specified in Table A.6.6.12.1.1-1.

Table A.6.6.12.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All 3 cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-DL-TDOA-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #0 before T2.

The general test parameters are listed in Table A.6.6.12.1.1-2, and cell specific test parameters are listed in Table A.6.6.12.1.1-3.

Table A.6.6.12.1.1-2: General test parameters for RSTD measurement reporting delay

Parameter		Unit	Value	Comment
Reference cell			Cell 1	Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case.
Neighbor cells			Cell 2 and Cell 3	Cell 2 and Cell 3 appear at random places in the neighbour cell list in the DL-TDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list.
SSB configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC configuration	Config 1		SMTC.2	
	Config 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH RMC configuration	Config 1		SR.1.1 FDD	
	Config 2		SR.1.1 TDD	
	Config 3		SR.2.1 TDD	
RMSI CORESET RMC configuration	Config 1		CR.1.1 FDD	As specified in clause A.3.1.2.1
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated CORESET RMC configuration	Config 1		CR.1.1 FDD	
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Initial BWP configuration	Config 1,2,3		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration	Config 1,2,3		DLBWP.1.1	
Active UL BWP configuration	Config 1,2,3		ULBWP.1.1	
PRS Configuration	Config 1		PRS.1.1 FR1	As specified in clause A.3.31
	Config 2		PRS.1.2 FR1	
	Config 3		PRS.2.1 FR1	
Physical cell ID PCI			(PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0	The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters
CP length			Normal	
DRX			OFF	
Measurement gap			GP#24 or GP#0	GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured

Radio frame receive time offset between the cells at the UE antenna connector	μs	Cell 2 to Cell 1: 0 Cell 3 to Cell 1: 3	PRS are transmitted from synchronous cells
Expected RSTD	μs	Cell 2: 3 Cell 3: 3 Other neighbour cells: randomly between -3 and 3	The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator
Expected RSTD uncertainty for all neighbour cells	μs	50	The corresponding parameter in the DL-TDOA assistance ta specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index
Number of cells provided in DL-TDOA assistance data		16	Including the reference cell
PRS muting info		Cell 1: '10' Cell 2: '01' Cell 3: '10'	Correponds to prs-MutingInfo defined in TS 37.355 [34] Cell 1 and Cell 3 will be configured with different Comb patterns or resource offsets
T1	s	3	The length of the time interval from the beginning of each test
T2	s	[1.28]	The length of the time interval that follows immediately after time interval T1

Table A.6.6.12.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

Parameter		Unit	Cell 1	Cell 2	Cell 3
NR RF Channel Number			1	1	1
Positiong frequency layer			1	1	1
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	N/A	N/A
N_{oc} Note 3	Config 1	dBm/SCS	-98		
	Config 2	dBm/SCS	-98		
	Config 3	dBm/SCS	-95		
PRS $\hat{E}_s/N_{oc}$		dB	-Infinity	-Infinity	-Infinity
SSB $\hat{E}_s/N_{oc}$		dB	10	-Infinity	-Infinity
Io Note 4	Config 1	dBm/9.36MHz	-68.63	-70.05	-70.05
	Config 2	dBm/9.36MHz	-68.63	-70.05	-70.05
	Config 3	dBm/38.16MHz	-63.20	-63.96	-63.96
SSB RP Note4	Config 1	dBm/SCS	-88	-Infinity	-Infinity
	Config 2	dBm/SCS	-88	-Infinity	-Infinity
	Config 3	dBm/SCS	-88	-Infinity	-Infinity
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

Table A.6.6.12.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

Parameter	Unit	Cell 1	Cell 2	Cell 3
		T2	T2	T2

NR RF Channel Number			1	1	1
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	OP.1	OP.1
PRACH configuration			FR1 PRACH configuration 1	FR1 PRACH configuration 1	FR1 PRACH configuration 1
N_{oc} Note 3	Config 1	dBm/SCS	-98	-98	-98
	Config 2	dBm/SCS	-98	-98	-98
	Config 3	dBm/SCS	-95	-95	-95
PRS $\hat{E}_s/N_{oc}$	Config 1	dB	-5.45	-11.67	-11.67
	Config 2	dB	-5.45	-11.67	-11.67
	Config 3	dB	-5.45	-11.67	-11.67
Io Note 4	Config 1	dBm/ 9.36MHz	-69.59	-69.93	-69.93
	Config 2	dBm/ 96.48MHz	-69.59	-69.93	-69.93
	Config 3	dBm/ 38.16MHz	-63.72	-63.89	-63.89
PRS $\hat{E}_s/I_{ot}$		dB	-6	-13	-13
Propagation Condition			AWGN		
Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					

A.6.6.12.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.1.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD_0000000 and RSTD1970049

A.6.6.12.2 NR RSTD measurement reporting delay test case for dual positioning frequency layers in FR1 SA

A.6.6.12.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR1 in standalone scenario when dual positioning frequency layers are configured.

The supported test configurations are specified in Table A.6.6.12.2.1-1.

Table A.6.6.12.2.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 3 is on a different RF channel with Cell 1 and Cell 2.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-DL-TDOA-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #0 before T2.

The general test parameters are listed in Table A.6.6.12.2.1-2, and cell specific test parameters are listed in Table A.6.6.12.2.1-3.

Table A.6.6.12.2.1-2: General test parameters for RSTD measurement reporting delay

Parameter		Unit	Value	Comment
Reference cell			Cell 1	Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case.
Neighbor cells			Cell 2 and Cell 3	Cell 2 and Cell 3 appear at random places in the neighbour cell list in the DL-TDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list.
SSB configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC configuration	Config 1		SMTC.2	
	Config 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH RMC configuration	Config 1		SR.1.1 FDD	
	Config 2		SR.1.1 TDD	
	Config 3		SR.2.1 TDD	
RMSI CORESET RMC configuration	Config 1		CR.1.1 FDD	As specified in clause A.3.1.2.1
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated CORESET RMC configuration	Config 1		CR.1.1 FDD	
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Initial BWP configuration	Config 1,2,3		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration	Config 1,2,3		DLBWP.1.1	
Active UL BWP configuration	Config 1,2,3		ULBWP.1.1	
PRS Configuration	Config 1		PRS.1.1 FR1	As specified in clause A.3.31
	Config 2		PRS.1.2 FR1	
	Config 3		PRS.2.1 FR1	
Physical cell ID PCI			(PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0	The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters
CP length			Normal	
DRX			OFF	
Measurement gap			GP#24 or GP#0	GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured

Radio frame receive time offset between the cells at the UE antenna connector	μs	Cell 2 to Cell 1: 0 Cell 3 to Cell 1: 3	PRS are transmitted from synchronous cells
Expected RSTD	μs	Cell 2: 3 Cell 3: 3 Other neighbour cells: randomly between -3 and 3	The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator
Expected RSTD uncertainty for all neighbour cells	μs	5	The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index
Number of cells provided in DL-TDOA assistance data		16	Including the reference cell
PRS muting info		Cell 1: ‘10’ Cell 2: ‘01’ Cell 3: ‘10’	Correponds to prs-MutingInfo defined in TS 37.355 [34] Cell 1 and Cell 3 will be configured with different Comb patterns or resource offsets
T1	s	3	The length of the time interval from the beginning of each test
T2	s	[1.28]	The length of the time interval that follows immediately after time interval T1

Table A.6.6.12.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

Parameter		Unit	Cell 1	Cell 2	Cell 3
NR RF Channel Number			1	1	2
Positiong frequency layer			1	1	2
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	N/A	N/A
N_{oc} Note 3	Config 1	dBm/SCS	-98		
	Config 2	dBm/SCS	-98		
	Config 3	dBm/SCS	-95		
PRS $\hat{E}_s/N_{oc}$		dB	-Infinity	-Infinity	-Infinity
Io Note 4	Config 1	dBm/ 9.36MHz	-68.63	-70.05	-70.05
	Config 2	dBm/ 9.36MHz	-68.63	-70.05	-70.05
	Config 3	dBm/ 38.16MHz	-63.20	-63.96	-63.96
SSB RP Note4	Config 1	dBm/SCS	-88	-Infinity	-Infinity
	Config 2	dBm/SCS	-88	-Infinity	-Infinity
	Config 3	dBm/SCS	-88	-Infinity	-Infinity
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

Table A.6.6.12.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2 and T3

Parameter	Unit	Cell 1	Cell 2	Cell 3
		T2	T2	T2

NR RF Channel Number			1	1	2
Positiong frequency layer			1	1	2
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	OP.1	OP.1
PRACH configuration			FR1 PRACH configuration 1	FR1 PRACH configuration 1	FR1 PRACH configuration 1
N_{oc} Note 3	Config 1	dBm/SCS	-98	-98	-98
	Config 2	dBm/SCS	-98	-98	-98
	Config 3	dBm/SCS	-95	-95	-95
PRS $\hat{E}_s/N_{oc}$	Config 1	dB	-5.45	-11.67	-11.67
	Config 2	dB	-5.45	-11.67	-11.67
	Config 3	dB	-5.45	-11.67	-11.67
Io Note 4	Config 1	dBm/ 9.36MHz	-69.59	-69.93	-69.93
	Config 2	dBm/ 96.48MHz	-69.59	-69.93	-69.93
	Config 3	dBm/ 38.16MHz	-63.72	-63.89	-63.89
PRS $\hat{E}_s/I_{ot}$		dB	-6	-13	-13
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

A.6.6.12.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.1.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD_0000000 and RSTD_1970049.

A.6.6.13 PRS-RSRP measurements

A.6.6.13.1 PRS-RSRP reporting delay test case for single positioning frequency layer

A.6.6.13.1.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement meets the delay requirements specified in clause 9.9.3.5 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.6.6.13.1.1-1.

Table A.6.6.13.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cell. Both cells are on the same NR RF channel in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The general test parameters are listed in Table A.6.6.13.1.1-2, and cell specific test parameters are listed in Table A.6.6.13.1.1-3.

Table A.6.6.13.1.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Reference cell		1, 2, 3	Cell 1	Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data.
Neighbour cell		1, 2, 3	Cell 2	Cell 2 is a neighbour cell in the positioning assistance data.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
$BW_{channel}$	MHz	1	10: $N_{RB,c}$ = 52	
		2	10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
Measurement gap		1, 2, 3	GP#24 or GP#0 Note 1	
CP length		1, 2, 3	Normal	
DRX		1, 2, 3	NA	OFF
Time offset between serving and neighbour cells	μs	1, 2, 3	3	Synchronous cells
Expected RSTD	μs	1, 2, 3	3	
Expected RSTD uncertainty	μs	1, 2, 3	5	
T1	s	1, 2, 3	2	
T2	s	1, 2, 3	[5]	
NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.				

Table A.6.6.13.1.1-3: Cell specific test parameters

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N/A	
		2	CR.1.1 TDD			
		3	CR.2.1 TDD			
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		N/A	
		2	CCR.1.1 TDD			
		3	CCR.2.1 TDD			
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD			
		3	TRS.1.2 TDD			
Initial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		N/A	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.4 FR1		PRS.1.4 FR1	
		2	PRS.1.4 FR1		PRS.1.4 FR1	
		3	PRS.2.4 FR1		PRS.2.4 FR1	
PRS muting info		1, 2, 3	'10'		'01'	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-3	-Infinity	-10
		2				
		3				
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-3	-Infinity	-10
		2				
		3				
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-101	-Infinity	-108
		2	-Infinity	-101	-Infinity	-108
		3	-Infinity	-98	-Infinity	-105
SS-RSRP Note 3	dBm/SCS kHz	1	-88	-88	-88	-88
		2	-88	-88	-88	-88
		3	-85	-85	-85	-85
Io	dBm/9.36 MHz	1	N/A	-62.25	N/A	-62.25
	dBm/9.36 MHz	2		-62.25		-62.25
	dBm/38.16 MHz	3		-56.16		-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP/PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.13.1.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.3.5, starting from the beginning of time interval T2.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.13.2 PRS-RSRP reporting delay test case for dual positioning frequency layer

A.6.6.13.2.1 Test purpose and Environment

The purpose of the test is to verify that the PRS-RSRP measurement meets the delay requirements specified in clause 9.9.3.5 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.6.6.13.2.1-1.

Table A.6.6.13.2.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell on NR RF channel #1 in FR1. Cell 2 is a neighbour cell on a different NR RF channel #2 in FR1. The test consists of two consecutive time intervals, with duration of T1 and T2. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The general test parameters are listed in Table A.6.6.13.2.1-2, and cell specific test parameters are listed in Table A.6.6.13.2.1-3.

Table A.6.6.13.2.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Reference cell		1, 2, 3	Cell 1	Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data.
Neighbour cell		1, 2, 3	Cell 2	Cell 2 is a neighbour cell in the positioning assistance data.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2	Cell 1 and Cell 2 are on differnet positioning frequency layers
$BW_{channel}$	MHz	1	10: $N_{RB,c}$ = 52	
		2	10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
Measurement gap		1, 2, 3	GP#24 or GP#0 Note 1	
CP length		1, 2, 3	Normal	
DRX		1, 2, 3	NA	OFF
Time offset between serving and neighbour cells	μs	1, 2, 3	3	Synchronous cells
Expected RSTD	μs	1, 2, 3	3	
Expected RSTD uncertainty	μs	1, 2, 3	5	
T1	s	1, 2, 3	2	
T2	s	1, 2, 3	[10]	
NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.				

Table A.6.6.13.2.1-3: Cell specific test parameters

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N/A	
		2	CR.1.1 TDD			
		3	CR.2.1 TDD			
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		N/A	
		2	CCR.1.1 TDD			
		3	CCR.2.1 TDD			
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD			
		3	TRS.1.2 TDD			
Initial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		N/A	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.4 FR1		PRS.1.4 FR1	
		2	PRS.1.4 FR1		PRS.1.4 FR1	
		3	PRS.2.4 FR1		PRS.2.4 FR1	
PRS muting info		1, 2, 3	‘10’		‘01’	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-3	-Infinity	-10
		2				
		3				
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-3	-Infinity	-10
		2				
		3				
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-101	-Infinity	-108
		2	-Infinity	-101	-Infinity	-108
		3	-Infinity	-98	-Infinity	-105
SS-RSRP Note 3	dBm/SCS kHz	1	-88	-88	-88	-88
		2	-88	-88	-88	-88
		3	-85	-85	-85	-85
Io	dBm/9.36 MHz	1	N/A	-62.25	N/A	-62.25
	dBm/9.36 MHz	2		-62.25		-62.25
	dBm/38.16 MHz	3		-56.16		-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP/PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.13.2.2 Test Requirements

The UE shall perform and report the PRS-RSRP measurements for Cell 1 and Cell 2, within the time limit specified in clause 9.9.3.5, starting from the beginning of time interval T2.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.14 UE Rx-Tx time difference measurements

A.6.6.14.1 UE Rx-Tx time difference measurement for single positioning frequency layer in FR1 SA

A.6.6.14.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.6.6.14.1.1-1.

Table A.6.6.14.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2. The beginning of the time interval T2 shall be aligned with the first PRS symbol in Cell 1 and Cell 2.

The *NR-Multi-RTT-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-Multi-RTT-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = [150] ms is the maximum processing time of the multi-RTT assistance data.

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.6.6.14.1.1-2 and Table A.6.6.14.1.1-3 respectively. The SRS configuration parameters for UE Rx-Tx time difference test is given in Table A.6.6.14.1.1-4.

Table A.6.6.14.1.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3	Cell 1	Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34].
Neighbour cell		1, 2, 3	Cell 2	Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34].
RF Channel Number		1, 2, 3	1	For both Cell 1 and Cell 2
$BW_{channel}$	MHz	1	10: $N_{RB,c}$ = 52	
		2	10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
Measurement gap		1, 2, 3	GP#24 or GP#0 Note 1	
CP length		1, 2, 3	Normal	
DRX		1, 2, 3	OFF	
Time offset between serving and neighbour cells	μs	1, 2, 3	3	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	10	
Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.				

Table A.6.6.14.1.1-3: Cell specific test parameters

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N/A	
		2	CR.1.1 TDD			
		3	CR.2.1 TDD			
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		N/A	
		2	CCR.1.1 TDD			
		3	CCR.2.1 TDD			
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD			
		3	TRS.1.2 TDD			
Initial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		N/A	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.2 FR1		PRS.1.2 FR1	
		2	PRS.1.2 FR1		PRS.1.2 FR1	
		3	PRS.2.2 FR1		PRS.2.2 FR1	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-2.41	-Infinity	-12.12
		2				
		3				
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-2	-Infinity	-10
		2				
		3				
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-100	-Infinity	-108
		2	-Infinity	-100	-Infinity	-108
		3	-Infinity	-97	-Infinity	-105
Io	dBm/9.36 MHz	1	N/A	-67.67	N/A	-67.67
	dBm/9.36 MHz	2		-67.67		-67.67
	dBm/38.16 MHz	3		-61.57		-61.57
Propagation Condition		1, 2, 3	AWGN			
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.						
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.						
Note 3: PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

Table A.6.6.14.1.1-4: SRS configuration for UE Rx-Tx time difference test

SRS-ResourceId	0
nrofSRS-Ports	Port1
transmissionComb	n4
combOffset-n4	0
cyclicShift-n4	0
resourceMapping startPosition	0
resourceMapping nrofSymbols	n4
resourceMapping repetitionFactor	n1
freqDomainPosition	0
freqDomainShift	0
freqHopping c-SRS	Matches $N_{RB,c}$
groupOrSequenceHopping	Neither
resourceType	Periodic
periodicityAndOffset-p	160*2^u, 20*2^u
sequenceId	0

A.6.6.14.1.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

A.6.6.14.2 UE Rx-Tx time difference measurement for dual positioning frequency layers in FR1 SA

A.6.6.14.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR1 in standalone scenario when dual positioning frequency layers are configured.

The supported test configurations in listed in Table A.6.6.9.2.1-1.

Table A.6.6.14.2.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). Cell 1 and Cell2 are on different RF channels in FR1.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2. The beginning of the time interval T2 shall be aligned with the first PRS symbol in Cell 1 and Cell 2.

The *NR-Multi-RTT-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-Multi-RTT-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the multi-RTT assistance data.

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.6.6.14.2.1-2 and Table A.6.6.14.2.1-3 respectively. The SRS configuration parameters for UE Rx-Tx time difference test is given in Table A.6.6.14.2.1-4.

Table A.6.6.14.2.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3	Cell 1	Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34].
Neighbour cell		1, 2, 3	Cell 2	Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34].
RF Channel Number		1, 2, 3	1	For Cell 1
RF Channel Number		1, 2, 3	2	For Cell 2
$BW_{channel}$	MHz	1	10: $N_{RB,c}$ = 52	
		2	10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
Measurement gap		1, 2, 3	GP#24 or GP#0 Note 1	
CP length		1, 2, 3	Normal	
DRX		1, 2, 3	OFF	
Time offset between serving and neighbour cells	μs	1, 2, 3	3	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	10	
Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.				

Table A.6.6.14.2.1-3: Cell specific test parameters

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N/A	
		2	CR.1.1 TDD			
		3	CR.2.1 TDD			
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		N/A	
		2	CCR.1.1 TDD			
		3	CCR.2.1 TDD			
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD			
		3	TRS.1.2 TDD			
Initial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		N/A	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.2 FR1		PRS.1.2 FR1	
		2	PRS.1.2 FR1		PRS.1.2 FR1	
		3	PRS.2.2 FR1		PRS.2.2 FR1	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-3	-Infinity	-13
		2				
		3				
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-3	-Infinity	-13
		2				
		3				
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-101	-Infinity	-111
		2	-Infinity	-101	-Infinity	-111
		3	-Infinity	-98	-Infinity	-108
Io	dBm/9.36 MHz	1	N/A	-68.28	N/A	-69.63
	dBm/9.36 MHz	2		-68.28		-69.63
	dBm/38.16 MHz	3		-62.19		-63.54
Propagation Condition		1, 2, 3	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.14.2.1-4: SRS configuration for UE Rx-Tx time difference test

SRS-ResourceId	0
nrofSRS-Ports	Port1
transmissionComb	n4
combOffset-n4	0
cyclicShift-n4	0
resourceMapping startPosition	0
resourceMapping nrofSymbols	n4
resourceMapping repetitionFactor	n1
freqDomainPosition	0
freqDomainShift	0
freqHopping c-SRS	Matches $N_{RB,c}$
groupOrSequenceHopping	Neither
resourceType	Periodic
periodicityAndOffset-p	160*2^u, 20*2^u
sequenceId	0

A.6.6.14.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

A.6.6.15 Idle Mode measurements of inter-RAT CA candidate cells for early reporting

A.6.6.15.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly retains the detected cell status for the idle mode CA measurement when UE transitions from RRC Connected mode to Idle mode, when the UE has entered Idle mode. Additionally, test that the UE performs the required measurements on the serving cell and the configured inter-RAT carrier for idle mode measurement reporting. This test will partly verify the Idle mode CA measurements in clause 4.4. In the test, connected mode DRX configuration is not configured in either PCell or PSCell.

Additionally, the purpose of this test is to verify that the SS-RSRP, SS-RSRQ, RSRP and RSRQ measurement accuracy is within the specified limits. This test will verify the accuracy requirements in Sections 10.1.2B and 10.1.7B for intra-frequency measurements and section 10.2.4 and 10.2.5 for the inter-RAT measurements for the supported test configurations in tables A.6.6.15.1-4 and A.6.6.15.1-5.

The supported test configurations are given in Table A.6.6.15.1-1. The test parameters are given in Tables A.6.6.15.1-2, A.6.6.15.1-3, A.6.6.15.1-4 and A.6.6.15.1-5 below. In the test there are two cells, cell 1, which is the PCell in connected, and serving cell in idle mode, on radio channel 1 in FR1, and cell 2, which is the PSCell in connected, and measured LTE inter-RAT cell in idle mode, on radio channel 2 in LTE.

For the purpose of testing absolute accuracy in idle mode in this set of test cases the cells in idle mode are on different carrier frequencies (NR FR1 and LTE). The absolute accuracy of RSRP and RSRQ inter-RAT measurements are tested by using the parameters in Table A.6.6.15.1-4 and Table A.6.6.15.1-5. In all test cases, Cell 1 is the serving and Cell 2 the target cell.

The test consists of 5 successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. During T1 cell 2, the PSCell, shall be configured.

Time duration T2 starts when UE has transmitted random access preamble on the PSCell. After T2, the UE is configured with idle mode CA measurements with the PSCell carrier as the target carrier. The connection is released [500]ms after T2 when the UE has sent random access preamble on the PSCell.

T3 starts when the connection is released. During the time periods T3 and T4 the UE is in Idle mode with the serving cell on the FR1 carrier. The UE is configured to perform inter-RAT idle mode CA/DC measurements on Cell 2 carrier. After the connection release and during T3, [1000] ms after T3 is started, the signal level of the inter-RAT carrier configured for idle mode CA/DC measurements is changed at which time T4 starts. T5 starts [65]s after T4, when the UE is paged for connection setup and UE is requested by the network to report idle mode CA/DC measurements.

Table A.6.6.15.1-1: Supported test configurations for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

Config	Description
1	FR1 FDD SSB SCS 15kHz BW 10MHz – LTE FDD 10MHz
2	FR1 FDD SSB SCS 15kHz BW 10MHz – LTE TDD 10MHz
3	FR1 TDD SSB SCS 30kHz BW 40MHz – LTE FDD 10MHz
4	FR1 TDD SSB SCS 30kHz BW 40MHz – LTE TDD 10MHz
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.6.6.15.1-2: General test parameters for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1 in FR1
PSCell		Cell 2	PSCell on RF channel number 2 in LTE
DRX		OFF	For both PCell and PSCell once configured
PRACH configuration in Cell 2		[PRACH_2CE]	PRACH configuration as specified in Clause A.3.16 in TS 36.133
CSI reporting periodicity and offset configuration for Cell 2	ms	2	
T1	s	[0.5]	During this time the PCell is known and PSCell is configured.
T2	s	[0.5]	PSCell access.
T3 + T4	s	[66]	During this time the UE is configured to perform inter-frequency measurements in idle mode on the PSCell carrier.
T5	s	[0.5]	UE is paged and connection is setup. Network requests measurement report from the UE.

Table A.6.6.15.1-3: Cell specific test parameters for NR cell for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

Parameter	Unit	Config	Test 1				
			Cell 1				
			T1	T2	T3	T4	T5
AoA setup		1,2,3,4	N/A				
Assumption for UE beams [Note 5] R: Rough		1,2,3,4	N/A	N/A	R	R	N/A
Frequency Range		1,2,3,4	FR1				
Duplex mode		1, 2	FDD				
		3, 4	TDD				
TDD Confguration 1: TDDConf.1.1 2: TDDConf.2.1		1,2	-				
		3,4	1	1	2	2	1
$BW_{channel}$ 1: 10: $N_{RB,c}$ = 52 2: 40: $N_{RB,c}$ = 106	MHz	1, 2	1	1	-	-	1
		3, 4	2	2	-	-	2
Initial Downlink BWP configuration		1,2,3,4	DLBWP.0.1				
Initial Uplink BWP configuration		1,2,3,4	ULBWP.0.1				
Dedicated Downlink BWP configuration 1: DLBWP.1.1		1,2,3,4	1	1	-	-	1
Dedicated Uplink BWP configuration 1: ULBWP.1.1		1,2,3,4	1	1	-	-	1
PDSCH Reference Measurement Channel 1: SR.1.1 FDD 2: SR.2.1 TDD	FDD	1,2	1	1	1	1	1
	TDD	3,4	2	2	2	2	2
TRS configuration		1,2,3,4	-				
TCI state		1,2,3,4	-				
RMSI CORESET parameters	FDD	1,2	CR.1.1 FDD				
	TDD	3,4	CR.2.1 TDD				
Dedicated CORESET parameters	FDD	1,2	CCR.1.1 FDD				
	TDD	3,4	CCR.2.1 TDD				
OCNG Patterns [Note1]		1,2,3,4	OP.1 defined in A.3.2.1				
SSB configuration 1: SSB.1 FR1 2: SSB.2 FR1		1,2	1				
		3,4	2				
SMTC configuration		1,2,3,4	SMTC.2				
Correlation Matrix and Antenna config		1,2,3,4	1x2 Low				
EPRE ratio of PSS to SSS	dB	1,2,3,4	0	0	-	-	0
EPRE ratio of PBCH DMRS to SSS			0	0	-	-	0
EPRE ratio of PBCH to PBCH DMRS			0	0	-	-	0
EPRE ratio of PDCCH DMRS to SSS			0	0	-	-	0
EPRE ratio of PDCCH to PDCCH DMRS			0	0	-	-	0
EPRE ratio of PDSCH DMRS to SSS			0	0	-	-	0
EPRE ratio of PDSCH to PDSCH			0	0	-	-	0
EPRE ratio of OCNG DMRS to SSS			0	0	-	-	0
N_{oc} [Note2]	dBm/15kHz	1,2	[-98]	[-98]	[-98]	[-98]	[-98]
		3,4					

N_{oc} Note2	dBm/SCS	1,2	[-98]	[-98]	[-98]	[-98]	[-98]
		3,4	[-95]	[-95]	[-95]	[-95]	[-95]
$\hat{E}_s/I_{ot}$	dB	1,2,3,4	[5]	[5]	[5]	[5]	[5]
$\hat{E}_s/N_{oc}$	dB	1,2,3,4	[5]	[5]	[5]	[5]	[5]
SS-RSRP Note3,4	dBm/SCS	1,2	[-93]	[-93]	[-93]	[-93]	[-93]
		3,4	[-90]	[-90]	[-90]	[-90]	[-90]
Io Note3,4	dBm/ 9.36 MHz	1,2	[-63.85]	[-63.85]	-[- 63.85]	-[- 63.85]	[-63.85]
	dBm/ 38.16 MHz	3,4	[-57.76]	[-57.76]	-[- 57.76]	-[- 57.76]	[-57.76]
Qrxlevmin	dBm/SCS	1	-	-	[-140]		-
		2	-	-	[-137]		-
		3	-	-	[TBD]	[TBD]	-
		4	-	-	[TBD]	[TBD]	-
Pcompensation	dB	1,2,3,4	-	-	0	0	-
$Qhyst_s$	dB	1,2,3,4	-	-	0	0	-
$Qoffset_{s, n}$	dB	1,2,3,4	-	-	0	0	-
Cell_selection_and_ reselection_quality_measurement		1,2,3,4	SS-RSRP				
Treselection	s	1,2,3,4	-		0		-
SnonintrasearchP	dB	1,2,3,4	-		[TBD]		-
SnonintrasearchQ	dB	1,2,3,4	-		[TBD]		-
$Thresh_{x, high}$	dB	1,2,3,4	-		[48]		-
$Thresh_{serving, low}$	dB	1,2,3,4	-		[44]		-
$Thresh_{x, low}$	dB	1,2,3,4	-		[50]		-
Propagation Condition	dB	1,2,3,4	-		AWGN		-

Table A.6.6.15.1-4: Cell specific test parameters for LTE cell for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

Parameter		Unit	Config	Test 1				
				Cell 2				
				T1	T2	T3	T4	T5
Frequency Range			1,2,3,4	LTE				
Duplex mode			1, 3	FDD				
			2, 4	TDD				
$BW_{channel}$		MHz	1,2,3,4	10	10	-	-	10
Measurement bandwidth		n_{PRB}	1,2,3,4	-	-	22-27	22-27	-
PDSCH Reference Measurement Channel 1: R.1 FDD 2: R.1 TDD		FDD	1,3	1	1	-	-	1
		TDD	2,4	2	2	-	-	2
PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 and A.3.1.2.2 in 36.133 1: R.6 FDD 2: R.6 TDD			1,3	1	1	-	-	1
			2,4	2	2	-	-	2
OCNG Patterns defined in A.3.2.1.1 (OP.2 FDD) and A.3.2.1.2 (OP.2 TDD) in 36.133 1: OP.2 FDD 2: OP.2 TDD			1,3	1				
			2,4	2				
Correlation Matrix and Antenna config			1,2,3,4	1x2 Low				
PBCH_RA		dB	1,2,3,4	N/A	N/A	0	0	N/A
PBCH_RB				N/A	N/A	0	0	N/A
PSS_RA				N/A	N/A	0	0	N/A
SSS_RA				N/A	N/A	0	0	N/A
PCFICH_RB				N/A	N/A	0	0	N/A
PHICH_RA				N/A	N/A	0	0	N/A
PHICH_RB				N/A	N/A	0	0	N/A
PDCCH_RA				N/A	N/A	0	0	N/A
PDCCH_RB				N/A	N/A	0	0	N/A
PDSCH_RA				N/A	N/A	0	0	N/A
PDSCH_RB				N/A	N/A	0	0	N/A
OCNG_RA Note 1				N/A	N/A	0	0	N/A
OCNG_RB Note 1				N/A	N/A	0	0	N/A
N_{oc} Note2		dBm/ 15kHz	1,2	[-98]	[-98]	[-98]	[-98]	[-98]
			3,4					
$\hat{E}_s/I_{ot}$		dB	1,2,3,4	[5]	[5]	[-3]	[8]	[5]
$\hat{E}_s/N_{oc}$		dB	1,2,3,4	[5]	[5]	[-3]	[8]	[5]
SS-RSRP Note3,4		dBm/SCS	1,2,3,4	[-93]	[-93]	[-101]	[-90]	[-93]

Io[Note3,4]		dBm/ 9.36 MHz	1,2, 3, 4	FFS	FFS	[FFS]	[FFS]	FFS
Qrxlevmin		dBm/SCS	1	-	-	[-140]		-
			2	-	-	[-137]		-
			3	-	-	[TBD]	[TBD]	-
			4	-	-	[TBD]	[TBD]	-
Pcompensation		dB	1,2,3,4	-	-	0	0	-
$Qhyst_s$		dB	1,2,3,4	-	-	0	0	-
$Qoffset_{s, n}$		dB	1,2,3,4	-	-	0	0	-
Cell_selection_and_ reselection_quality_measurement			1,2,3,4	RSRP and RSRQ				
Treselection		s	1,2,3,4	-		0		-
SnonintrasearchP		dB	1,2,3,4	-		[TBD]		-
SnonintrasearchQ		dB	1,2,3,4	-		[TBD]		-
$Thresh_{x, high}$		dB	1,2,3,4	-		[48]		-
$Thresh_{serving, low}$		dB	1,2,3,4	-		[44]		-
$Thresh_{x, low}$		dB	1,2,3,4	-		[50]		-
Propagation Condition		dB	1,2,3,4	-		AWGN		-

Table A.6.6.15.1-5: General idle mode test parameters for Idle Mode measurements of inter-frequency CA candidate cells for early reporting

Parameter	Unit	Test configuration	Value	Comment
Serving cell		1, 2, 3, 4	Cell1	The UE camps on cell 1 which is the former PCell.
Neighbour cell		1, 2, 3, 4	Cell2	The UE shall perform inter-frequency measurements on cell 2 which is the former PSCell.
RF Channel Number		1, 2, 3, 4	1, 2	
Time offset between cells		1, 2, 3, 4	3 μs	Synchronous cells
Access Barring Information	-	1, 2, 3,4	Not Sent	No additional delays in random access procedure.
SSB configuration		1, 2	SSB.1 FR1	Serving cell
		3, 4	SSB.2 FR1	Serving cell
SMTC configuration Serving cell		1, 2, 3, 4	SMTC.2	
DRX cycle length	s	1, 2, 3, 4	1.28	The value shall be used for all cells in the test.
PRACH configuration index		1, 2, 3, 4	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell		1, 2, 3, 4	Not configured	
T3	s	1, 2, 3, 4	[0.5]	T3 needs to be defined so that cell measurement time is taken into account.
T4	s	1, 2, 3, 4	[65]	T4 needs to be defined so that cell measurement time is taken into account.

A.6.6.15.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During time durations T1 the UE shall start transmitting preamble on PSCell. During T2 the UE perform intra-frequency measurements on the PCell and the PSCell.

During the time-period T3 the connection is released, and UE enters idle mode. During the time period T3 and T4 the UE is camped in Idle mode and at T4 the signal level of cell 2 is changed. The UE shall not perform reselection. The UE shall perform Idle Mode CA measurement according to Section 4.4.

At the start of T5 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report. The UE shall send early measurement report to the PCell including idle mode CA/DC measurement from cell 2.

After receiving the requested early measurement report, the test equipment verifies that the accuracy of measurement reported for serving Cell 1 and Cell 2 meets the requirements in Sections 10.1.2B and 10.1.7B and Sections 10.2.4 and 10.2.5, respectively and test ends.

A.6.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.

- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.6.7.1 SS-RSRP

A.6.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.6.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID			489	0	489	0	489	0
SSB ARFCN			freq1		freq1		freq1	
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
BWP BW	Config 1		10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
Downlink initial BWP configuration			DLBWP.0.1					
Downlink dedicated BWP configuration			DLBWP.1.1					
Uplink initial BWP configuration			ULBWP.0.1					
Uplink dedicated BWP configuration			ULBWP.1.1					
TRS configuration	Config 1		TRS.1.1 FDD	NA	TRS.1.1 FDD	NA	TRS.1.1 FDD	NA
	Config 2		TRS.1.1 TDD	NA	TRS.1.1 TDD	NA	TRS.1.1 TDD	NA
	Config 3		TRS.1.2 TDD	NA	TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-	CR.1.1 FDD	-
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
Control channel RMC	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR2.1 TDD		CCR2.1 TDD		CCR2.1 TDD	
SSB configuration	Config 1		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 2		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 3		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
	Config 2,3	μs	-	3	-	3	-	3
SMTC configuration	Config 1		SMTC.2					
	Config 2,3		SMTC.1					

OCNG Patterns				OCNG pattern 1					
PDSCH/PDCCH subcarrier spacing	Config 1,2		kHz	15 kHz					
	Config 3			30kHz					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/15KhZ	-106		-88		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not applicable Note 5		-94		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
N_{oc} Note2	Config 1,2		dBm/SCS	-106		-88		Same as Noc/15kHz	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not applicable Note 5		-91		-111	
		NR_FDD_FR1_B						-110.5	
		NR_TDD_FR1_C						-110	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-109.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_F						-108.5	
		NR_FDD_FR1_G						-108	
		NR_FDD_FR1_H						-107.5	
$\hat{E}_s/I_{ot}$			dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
$\hat{E}_s/N_{oc}$			dB	6	1	6	1	3	0
SS-RSRP Note3	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-100	-105	-82	-87	-111.00	-114.00
		NR_FDD_FR1_B						-110.50	-113.50
		NR_TDD_FR1_C						-	-

								110.00	113.00
		NR_FDD_FR1_D, NR_TDD_FR1_D						-109.50	-112.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109.00	-112.00
		NR_FDD_FR1_F						-108.50	-111.50
		NR_FDD_FR1_G						-108.00	-111.00
		NR_FDD_FR1_H						-107.50	-110.50
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not applicable Note 5	Not applicable Note 5	-85	-90	-108.00	-111.00
		NR_FDD_FR1_B						-107.50	-110.50
		NR_TDD_FR1_C						-107.00	-110.00
		NR_FDD_FR1_D, NR_TDD_FR1_D						-106.50	-109.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						-106.00	-109.00
		NR_FDD_FR1_F						-105.50	-108.50
		NR_FDD_FR1_G						-105.00	-108.00
		NR_FDD_FR1_H						-104.50	-107.50
Io Note3	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/9.36MHz	-70.09		-52.09		-80.03	
		NR_FDD_FR1_B						-79.53	
		NR_TDD_FR1_C						-79.03	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-78.53	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-78.03	
		NR_FDD_FR1_F						-77.53	
		NR_FDD_FR1_G						-77.03	
		NR_FDD_FR1_H						-76.53	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/38.16MHz	Not applicable Note 5 -		-51.99		-73.94	
		NR_FDD_FR1_B						-73.44	
		NR_TDD_FR1_C						-72.94	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-72.44	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-71.94	
		NR_FDD_FR1_F						-71.44	
		NR_FDD_FR1_G						-70.94	
		NR_FDD_FR1_H						-70.44	
Propagation condition			-	AWGN					
Antenna configuration				1x2					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not

	settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Subtest 1 is not used when testing with 30kHz SSB SCS.
Note 6:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.6.7.1.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.1.2.1-1.

Table A.6.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~3		freq1	freq2	freq1	freq2
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	2		10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
Duplex mode	1		FDD		FDD	
	2		TDD		TDD	
	3		TDD		TDD	
TDD configuration	1		N/A		N/A	
	2		TDDConf.1.1		TDDConf.1.1	
	3		TDDConf.2.1		TDDConf.2.1	
PDSCH Reference measurement channel	1		SR.1.1 FDD	-	SR.1.1 FDD	-
	2		SR.1.1 TDD		SR.1.1 TDD	
	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	-	CR.1.1 FDD	-
	2		CR.1.1 TDD	-	CR.1.1 TDD	-
	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
SSB configuration	1		SSB.1 FR1		SSB.1 FR1	
	2		SSB.1 FR1		SSB.1 FR1	
	3		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~3		OP.1		OP.1	
TRS configuration	1		TRS.1.1 FDD	-	TRS.1.1 FDD	
	2		TRS.1.1 TDD		TRS.1.1 TDD	
	3		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	
Time offset with Cell 1	1	ms	-	3	-	3
	2,3	μs	-	3	-	3
SMTC configuration	1		SMTC.2		SMTC.2	
	2,3		SMTC.1		SMTC.1	
EPRE ratio of PSS to SSS	1~3	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						

N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15 kHz	-94.65		(N_{oc} for Channel 2 +8dB)
	NR_FDD_FR1_B					-114.5
	NR_TDD_FR1_C					-114
	NR_FDD_FR1_D, NR_TDD_FR1_D					-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E					-113
	NR_FDD_FR1_F					-112.5
	NR_FDD_FR1_G					-112
	NR_FDD_FR1_H					-111.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	1,2	dBm/SS B SCS	-94.65	(N_{oc} for Channel 2 +8dB)	-115
	NR_FDD_FR1_B					-114.5
	NR_TDD_FR1_C					-114
	NR_FDD_FR1_D, NR_TDD_FR1_D					-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E					-113
	NR_FDD_FR1_F					-112.5
	NR_FDD_FR1_G					-112
	NR_FDD_FR1_H					-111.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	3		-91.65	(N_{oc} for Channel 2 +8dB)	-112.00
	NR_FDD_FR1_B					-111.50
	NR_TDD_FR1_C					-111.00
	NR_FDD_FR1_D, NR_TDD_FR1_D					-110.50
	NR_FDD_FR1_E, NR_TDD_FR1_E					-110.00
	NR_FDD_FR1_F					-109.50
	NR_FDD_FR1_G					-109.00
	NR_FDD_FR1_H					-108.50
$\hat{E}_s/I_{ot}$		1~3	dB	10 / 10	13	-3
SS-RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	1,2	dBm/SCS	-84.65	(RSRP for Cell 2 +25dB)	-118.00
	NR_FDD_FR1_B					-117.50
	NR_TDD_FR1_C					-117.00
	NR_FDD_FR1_D, NR_TDD_FR1_D					-116.50
	NR_FDD_FR1_E, NR_TDD_FR1_E					-116.00
	NR_FDD_FR1_F					-115.50
	NR_FDD_FR1_G					-115.00
	NR_FDD_FR1_H					-114.50
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	3		-81.65	(RSRP for Cell 2 +25dB)	-115.00
	NR_FDD_FR1_B					-114.50
	NR_TDD_FR1_C					-114.00
	NR_FDD_FR1_D, NR_TDD_FR1_D					-113.50
	NR_FDD_FR1_E, NR_TDD_FR1_E					-113.00
	NR_FDD_FR1_F					-112.50
	NR_FDD_FR1_G					-112.00
	NR_FDD_FR1_H					-111.50

Io[Note3]	NR_FDD_FR1_A, NR_TDD_FR1_A[NOTE 5],	1,2	dBm/ 9.36MHz	-56.28		(Io for Channel 2 +19.75dB)	-85.28
	NR_FDD_FR1_B						-84.78
	NR_TDD_FR1_C						-84.28
	NR_FDD_FR1_D, NR_TDD_FR1_D						-83.78
	NR_FDD_FR1_E, NR_TDD_FR1_E						-83.28
	NR_FDD_FR1_F						-82.78
	NR_FDD_FR1_G						-82.28
	NR_FDD_FR1_H						-81.78
	NR_FDD_FR1_A, NR_TDD_FR1_A[NOTE 5],	3	dBm/ 38.16MHz	-50.19		(Io for Channel 2 +19.75dB)	-79.19
	NR_FDD_FR1_B						-78.69
	NR_TDD_FR1_C						-78.19
	NR_FDD_FR1_D, NR_TDD_FR1_D						-77.69
	NR_FDD_FR1_E, NR_TDD_FR1_E						-77.19
	NR_FDD_FR1_F						-76.69
	NR_FDD_FR1_G						-76.19
	NR_FDD_FR1_H						-75.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	10	13	-3
Propagation condition		1~3	-	AWGN		AWGN	
Antenna configuration		1~3		1x2		1x2	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.							

A.6.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.1.1 and relative requirement in clause 10.1.4.1.2.

A.6.7.1.3 Void

A.6.7.2 SS-RSRQ

A.6.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.6.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.2.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1		freq1		freq1	
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
Gap Pattern ID			0					
BWP configuration	Initial DL BWP		DLBWP.0.1					
	Dedicated DL BWP		DLBWP.1.1					
	Initial UL BWP		ULBWP.0.1					
	Dedicated UL BWP		ULBWP.1.1					
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD	
Control Channel RMC	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD		CCR.2.1 TDD	
TRS Configuration	Config 1		TRS.1.1 FDD	-	TRS.1.1 FDD	-	TRS.1.1 FDD	-
	Config 2		TRS.1.1 TDD		TRS.1.1 TDD		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns			OP. 1					
SS-RSSI-Measurement			Not Applicable					
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
	Config 2,3	µs	-	3	-	3	-	3
SMTC configuration	Config 1		SMTC.2					
	Config 2,3		SMTC.1					
SSB configuration	Config 1,2		SSB.1 FR1					
	Config 3		SSB.2 FR1					
CSI-RS for tracking	Config 1		TRS.1.1 FDD					
	Config 2		TRS.1.1 TDD					
	Config 3		TRS.1.2 TDD					
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz					
	Config 3		30kHz					
EPRE ratio of PSS to SSS		dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								

EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/15kHz	-85		-101		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-91		-		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-85		-101		-114 -113.5 -113 -112.5 -112 -111.5 -111 -110.5	
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							
		NR_FDD_FR1_D, NR_TDD_FR1_D							
		NR_FDD_FR1_E, NR_TDD_FR1_E							
		NR_FDD_FR1_F							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-88		-		-111	
		NR_FDD_FR1_B						-110.5	
		NR_TDD_FR1_C						-110	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-109.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_F						-108.5	
		NR_FDD_FR1_G						-108	
		NR_FDD_FR1_H						-107.5	
$\hat{E}_s/I_{ot}$			dB	-1.76		-4.7		-5..46	-5.46
$\hat{E}_s/N_{oc}$			dB	3	3	-2.9	-2.9	-4	-4
SS-RSRP Note	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A	dBm/SCS	-82	-82	-103.9	-103.9	-118	-118

3		NOTE 6							
		NR_FDD_FR1_B						-117.5	-117.5
		NR_TDD_FR1_C						-117	-117
		NR_FDD_FR1_D, NR_TDD_FR1_D						-116.5	-116.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-116	-116
		NR_FDD_FR1_F						-115.5	-115.5
		NR_FDD_FR1_G						-115	-115
		NR_FDD_FR1_H						-114.5	-114.5
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-85	-85	-	-	-115	-115
		NR_FDD_FR1_B						-114.5	-114.5
		NR_TDD_FR1_C						-114	-114
		NR_FDD_FR1_D, NR_TDD_FR1_D						-113.5	-113.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-113	-113
		NR_FDD_FR1_F						-112.5	-112.5
		NR_FDD_FR1_G						-112	-112
		NR_FDD_FR1_H						-111.5	-111.5
SS-RSRQ[Note3]		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							
		NR_FDD_FR1_D, NR_TDD_FR1_D							
		NR_FDD_FR1_E, NR_TDD_FR1_E							
		NR_FDD_FR1_F							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
Io[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/9.36MHz	-50		-70		-83.5	
		NR_FDD_FR1_B						-83	
		NR_TDD_FR1_C						-82.5	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-82	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-81.5	
		NR_FDD_FR1_F						-81	
		NR_FDD_FR1_G						-80.5	
		NR_FDD_FR1_H						-80	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/38.16MHz	-50		-		-77.4	
		NR_FDD_FR1_B						-76.9	
		NR_TDD_FR1_C						-76.4	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-75.9	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-75.4	
		NR_FDD_FR1_F						-74.9	
		NR_FDD_FR1_G						-74.4	
		NR_FDD_FR1_H						-73.9	
Propagation condition			-	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN

Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: NR operating band groups are as defined in clause 3.5.2. Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.							

A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.6.7.2.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.2.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.2.2.2-2: SS-RSRQ Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
Gap pattern ID	Config 1,2,3		0					
BWP BW	Config 1		10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: NRB,c = 106					
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1,4		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2,5		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1 .1 FDD	-	CCR.1. 1 FDD	-	CCR.1. 1 FDD	-
	Config 2		CCR.1 .1 TDD		CCR.1. 1 TDD		CCR.1. 1 TDD	
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD	
TRS Configuration	Config 1		TRS.1. 1 FDD	-	TRS.1.1 FDD	-	TRS.1. 1 FDD	-
	Config 2		TRS.1. 1 TDD		TRS.1.1 TDD		TRS.1. 1 TDD	
	Config 3		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD	
OCNG Patterns			OCNG pattern 1					
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
	Config 2,3	μs	-	3	-	3	-	3
SMTC configuration	Config 1		SMTC pattern 2					
	Config 2,3		SMTC pattern 1					
SSB configuration	Config 1,2		SSB pattern 1 in FR1					
	Config 3		SSB pattern 2 in FR1					
CSI-RS for tracking	Config 1		TRS.1.1 FDD					
	Config 2		TRS.1.1 TDD					
	Config 3		TRS.1.2 TDD					
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz					
	Config 3		30 kHz					
EPRE ratio of PSS to SSS		dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								

EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-80.18		-106		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
N_{oc} Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-86.27		-113		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-80.18		-106		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-83.27		-110		-113	
		NR_FDD_FR1_B						-112.5	
		NR_TDD_FR1_C						-112	
		NR_FDD_FR1_D NR_TDD_FR1_D						-111.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	
		NR_FDD_FR1_F						-110.5	
		NR_FDD_FR1_G						-110	
		NR_FDD_FR1_H						-109.5	
$\hat{E}_s/I_{ot}$			dB	-1.75		-1.75		3	-1.75
$\hat{E}_s/N_{oc}$			dB	-1.75		-1.75		3	-1.75
SS-RSRP Note3	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-81.93	-81.93	-107.75	-107.75	-113	-117.75
		NR_FDD_FR1_B						-112.5	-117.25

		NR_TDD_FR1_C						-112	-116.75
		NR_FDD_FR1_D NR_TDD_FR1_D						-111.5	-116.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	-115.75
		NR_FDD_FR1_F						-110.5	-115.2
		NR_FDD_FR1_G						-110	-114.75
		NR_FDD_FR1_H						-109.5	-114.25
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-85.02	-85.02	-111.75	-111.75	-110	-114.75
		NR_FDD_FR1_B						-109.5	-114.25
		NR_TDD_FR1_C						-109	-113.75
		NR_FDD_FR1_D NR_TDD_FR1_D						-108.5	-113.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	-112.75
		NR_FDD_FR1_F						-107.5	-112.2
		NR_FDD_FR1_G						-107	-111.75
		NR_FDD_FR1_H						-106.5	-111.25
SS-RSRQ Note3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76T
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							
		NR_FDD_FR1_D NR_TDD_FR1_D							
		NR_FDD_FR1_E NR_TDD_FR1_E							
		NR_FDD_FR1_F							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
Io Note3	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-50		-75.83		-83.28	-85.83
		NR_FDD_FR1_B						-82.78	-85.33
		NR_TDD_FR1_C						-82.28	-84.83
		NR_FDD_FR1_D NR_TDD_FR1_D						-81.78	-84.33

		NR_FDD_FR1_E NR_TDD_FR1_E						-81.28	-83.83
		NR_FDD_FR1_F						-80.78	-83.33
		NR_FDD_FR1_G						-80.28	-82.83
		NR_FDD_FR1_H						-79.78	-82.33
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-50		-76.73		-77.19	-79.73
		NR_FDD_FR1_B						-76.69	-79.23
		NR_TDD_FR1_C						-76.19	-78.73
		NR_FDD_FR1_D NR_TDD_FR1_D						-75.69	-78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	-77.73
		NR_FDD_FR1_F						-74.69	-77.23
		NR_FDD_FR1_G						-74.19	-76.73
		NR_FDD_FR1_H						-73.69	-76.53
Propagation condition			-	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration				1x2	1x2	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: NR operating band groups are as defined in clause 3.5.2.
Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.6.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.3 SS-SINR

A.6.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.6.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.3.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1		freq1	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
Downlink initial BWP configuration			DLBWP.0.1			
Downlink dedicated BWP configuration			DLBWP.1.1			
Uplink initial BWP configuration			ULBWP.0.1			
Uplink dedicated BWP configuration			ULBWP.1.1			
DRX Cycle configuration		ms	Not Applicable			
TRS configuration	Config 1		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD	
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR.2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns			OP.1			
SS-RSSI-Measurement			Not Applicable			
SMTC configuration	Config 1		SMTC.2			
	Config 2,3		SMTC.1			
Time offset with Cell 1	Config 1	ms	-	3	-	3
	Config 2,3	µs	-	3	-	3
SSB configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15			
	Config 3		30			
EPRE ratio of PSS to SSS		dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						

EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/15kHz	-93		-116	
		NR_FDD_FR1_B				-115.5	
		NR_TDD_FR1_C				-115	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-114.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-114	
		NR_FDD_FR1_F				-113.5	
		NR_FDD_FR1_G				-113	
		NR_FDD_FR1_H				-112.5	
N_{oc} Note2	Config 1,2		dBm/SCS	-93		Same as Noc for 15 kHz	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-90		-113	
		NR_FDD_FR1_B				-112.5	
		NR_TDD_FR1_C				-112	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-111.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-111	
		NR_FDD_FR1_F				-110.5	
		NR_FDD_FR1_G				-110	
		NR_FDD_FR1_H				-109.5	
$\hat{E}_s/I_{ot}$			dB	0	-3.19	-5.46	-5.46
$\hat{E}_s/N_{oc}$			dB	4.54	2.66	-4	-4
SS-RSRP Note3	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-88.46	-90.34	-120	-120
		NR_FDD_FR1_B				-119.5	-119.5
		NR_TDD_FR1_C				-119	-119
		NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5	-118.5
		NR_FDD_FR1_E, NR_TDD_FR1_E				-118	-118
		NR_FDD_FR1_F				-117.5	-117.5
		NR_FDD_FR1_G				-117	-117
		NR_FDD_FR1_H				-116.5	-116.5
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-85.46	-87.34	-117	-117
		NR_FDD_FR1_B				-116.5	-116.5
		NR_TDD_FR1_C				-116	-116
		NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5	-115.5
		NR_FDD_FR1_E, NR_TDD_FR1_E				-115	-115
		NR_FDD_FR1_F				-114.5	-114.5
		NR_FDD_FR1_G				-114	-114
		NR_FDD_FR1_H				-113.5	-113.5
SS-SINR Note3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dB	0	-3.19	-5.46	-5.46

		NR_FDD_FR1_B					
		NR_TDD_FR1_C					
		NR_FDD_FR1_D, NR_TDD_FR1_D					
		NR_FDD_FR1_E, NR_TDD_FR1_E					
		NR_FDD_FR1_F					
		NR_FDD_FR1_G					
		NR_FDD_FR1_H					
Io[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-57.5		-85.51	
		NR_FDD_FR1_B				-85.01	
		NR_TDD_FR1_C				-84.51	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-84.01	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-83.51	
		NR_FDD_FR1_F				-83.01	
		NR_FDD_FR1_G				-82.51	
		NR_FDD_FR1_H				-82.01	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	-51.41		-79.41	
		NR_FDD_FR1_B				-78.91	
		NR_TDD_FR1_C				-78.41	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-77.91	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-77.41	
		NR_FDD_FR1_F				-76.91	
		NR_FDD_FR1_G				-76.41	
		NR_FDD_FR1_H				-75.91	
Propagation condition			-	AWGN			
Antenna configuration			-	1x2			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in clause 3.5.2.

Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.6.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.6.7.3.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.3.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
Downlink initial BWP configuration			DLBWP.0.1					
Downlink dedicated BWP configuration			DLBWP.1.1					
Uplink initial BWP configuration			ULBWP.0.1					
Uplink dedicated BWP configuration			ULBWP.1.1					
DRX Cycle configuration		ms	Not Applicable					
Gap pattern ID			0	-	0	-	0	-
TRS configuration	Config 1		TRS.1.1 FDD		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD		TRS.1.1 TDD		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR2.1 TDD		CCR2.1 TDD		CCR2.1 TDD	
OCNG Patterns			OP.1					
SS-RSSI-Measurement			Not Applicable					
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
	Config 2,3	μs	-	3	-	3	-	3
SMTC configuration	Config 1		SMTC pattern 2					
	Config 2,3		SMTC pattern 1					
SSB configuration	Config 1,2		SSB.1 FR1					
	Config 3		SSB.2 FR1					
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15					
	Config 3		30					
EPRE ratio of PSS to SSS		dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								

EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-88		-108.5		-119.5	
		NR_FDD_FR1_B						-119	
		NR_TDD_FR1_C						-118.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-118	
		NR_FDD_FR1_E NR_TDD_FR1_E						-117.5	
		NR_FDD_FR1_F						-117	
		NR_FDD_FR1_G						-116.5	
		NR_FDD_FR1_H						-116	
N_{oc} Note2	Config 1,2		dBm/SCS	-88		-108.5		Same as Noc for 15kHz	
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-85		-105.5		-116.5	
		NR_FDD_FR1_B						-116	
		NR_TDD_FR1_C						-115.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-115	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114.5	
		NR_FDD_FR1_F						-114	
		NR_FDD_FR1_G						-114.5	
		NR_FDD_FR1_H						-113	
$\hat{E}_s/I_{ot}$			dB	-1.75	-1.75	20	20	-4.0	-4.0
$\hat{E}_s/N_{oc}$			dB	-1.75		20		-4.0	
SS-RSRP Note3	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-89.75		-88.5		-123.5	
		NR_FDD_FR1_B						-123	
		NR_TDD_FR1_C						-122.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-122	
		NR_FDD_FR1_E NR_TDD_FR1_E						-121.5	
		NR_FDD_FR1_F						-121	
		NR_FDD_FR1_G						-120.5	
		NR_FDD_FR1_H						-120	
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-86.75		-85.5		-120.5	
		NR_FDD_FR1_B						-120	
		NR_TDD_FR1_C						-119.5	
		NR_FDD_FR1_D						-119	

		NR_TDD_FR1_D				
		NR_FDD_FR1_E NR_TDD_FR1_E				-118.5
		NR_FDD_FR1_F				-118
		NR_FDD_FR1_G				-117.5
		NR_FDD_FR1_H				-117
SS-SINR[Note3]		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dB	-1.75	20	-4.0
		NR_FDD_FR1_B				
		NR_TDD_FR1_C				
		NR_FDD_FR1_D NR_TDD_FR1_D				
		NR_FDD_FR1_E NR_TDD_FR1_E				
		NR_FDD_FR1_F				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
Io[Note3]	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-57.83	-60.5	-90.09
		NR_FDD_FR1_B				-89.59
		NR_TDD_FR1_C				-89.09
		NR_FDD_FR1_D NR_TDD_FR1_D				-88.59
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09
		NR_FDD_FR1_F				-87.59
		NR_FDD_FR1_G				-87.09
		NR_FDD_FR1_H				-86.59
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	-51.73	-54.41	-84
		NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C				-83
		NR_FDD_FR1_D NR_TDD_FR1_D				-82.5
		NR_FDD_FR1_E NR_TDD_FR1_E				-82
		NR_FDD_FR1_F				-81.5
		NR_FDD_FR1_G				-81
		NR_FDD_FR1_H				-80.5
Propagation condition			-	AWGN		
Antenna configuration			-	1x2		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: NR operating band groups are as defined in clause 3.5.2. Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.						

A.6.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.4 L1-RSRP measurement for beam reporting

A.6.7.4.1 SSB based L1-RSRP measurement

A.6.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.6.7.4.1.1-1.

Table A.6.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.6.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter		Config	Unit	Test 1	Test 2
SSB GSCN		1~3		freq1	freq1
Duplex mode		1		FDD	FDD
		2		TDD	TDD
		3		TDD	TDD
TDD Configuration		1		N/A	N/A
		2		TDDConf.1.1	TDDConf.1.1
		3		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$		1	MHz	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
		2		10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
		3		40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel		1		SR.1.1 FDD	SR.1.1 FDD
		2		SR.1.1 TDD	SR.1.1 TDD
		3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference Channel		1		CR.1.1 FDD	CR.1.1 FDD
		2		CR.1.1 TDD	CR.1.1 TDD
		3		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET Reference Channel		1		CCR.1.1 FDD	CCR.1.1 FDD
		2		CCR.1.1 TDD	CCR.1.1 TDD
		3		CCR.2.1 TDD	CCR.2.1 TDD
SSB configuration		1		SSB.3 FR1	SSB.3 FR1
		2		SSB.3 FR1	SSB.3 FR1
		3		SSB.4 FR1	SSB.4 FR1
OCNG Patterns		1~3		OP.1	OP.1
Initial BWP Configuration		1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
TRS configuration		1		TRS.1.1 FDD	TRS.1.1 FDD
		2		TRS.1.1 TDD	TRS.1.1 TDD
		3		TRS.1.2 TDD	TRS.1.2 TDD
Dedicated BWP configuration		1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration		1~3		SMTC.1	SMTC.1
reportConfigType		1~3		periodic	periodic
reportQuantity		1~3		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS		1~3		2	2
L1-RSRP reporting period		1~3		slot80	slot80
EPRE ratio of PSS to SSS		1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH DMRS					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A	1~3	dBm/15kHz	-94.65	-117

	NOTE 5				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/SSB SCS	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-91.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{E}_s/I_{ot}$		1~3	dB	10	-3
SSB RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/SSB SCS	-84.65	-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-118
	NR_FDD_FR1_F				-117.5
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-81.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5

Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/9.36 MHz	-56.28	-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D				-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_F				-84.78
	NR_FDD_FR1_G				-84.28
	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3	dBm/38.16 MHz	-50.19	-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C				-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D				-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_F				-78.69
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	-3
Propagation condition		1~3		AWGN	AWGN
Antenna configuration		1~3		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.					

A.6.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.6.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.6.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.4.2.1-1.

Table A.6.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.6.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
Duplex mode	1		FDD	FDD
	2		TDD	TDD
	3		TDD	TDD
TDD Configuration	1		N/A	N/A
	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 FDD
	2		SR.1.1 TDD	SR.1.1 TDD
	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 FDD
	2		CR.1.1 TDD	CR.1.1 TDD
	3		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 FDD
	2		CCR.1.1 TDD	CCR.1.1 TDD
	3		CCR.2.1 TDD	CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1	SSB.3 FR1
	2		SSB.3 FR1	SSB.3 FR1
	3		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~3		OP.1	OP.1
TRS configuration	1		TRS.1.1 FDD	TRS.1.1 FDD
	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
	2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportConfigType	1~3		periodic	periodic
reportQuantity	1~3		cri-RSRP	cri-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS	1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG				

DMRS Note 1					
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15kHz	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-91.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{E}_s/I_{ot}$		1~3	dB	10	-3
CSI-RS RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-84.65	-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-118
	NR_FDD_FR1_F				-117.5
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-81.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5

	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/9.36 MHz	-56.28	-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D				-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_F				-84.78
	NR_FDD_FR1_G				-84.28
	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3	dBm/38.16 MHz	-50.19	-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C				-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D				-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_F				-78.69
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	-3
Propagation condition		1~3		AWGN	AWGN
Antenna configuration		1~3		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.					

A.6.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.19.2.

A.6.7.5 E-UTRAN RSRP

A.6.7.5.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.2 for SA inter-RAT E-UTRAN RSRP measurements.

A.6.7.5.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.5.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRP are tested by using the parameters in A.6.7.5.1.2-2 and A.6.7.5.1.2-3.

Table A.6.7.5.1.2-1: Inter-RAT E-UTRAN RSRP supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.5.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		N/A
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
$BW_{channel}$	Config 1, 4	MHz	10: $N_{RB,c}$ = 52 (FDD)
	Config 2, 5		10: $N_{RB,c}$ = 52 (TDD)
	Config 3, 6		40: $N_{RB,c}$ = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement channel	Config 1, 4		SR.1.1 FDD
	Config 2, 5		SR.1.1 TDD
	Config 3, 6		SR.2.1 TDD
CORSET reference channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
BWP configurations	Initial DL BWP		DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
OCNG pattern[Note1]			OP.1
SMTC configuration			SMTC.1
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS			
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMRS			
N_{oc}[Note2]		dBm/15 kHz	-104
N_{oc}[Note2]	Config 1, 2, 4, 5	dBm/SCS	-104
	Config 3, 6		-101
$\hat{E}_s/N_{oc}$		dB	17
$\hat{E}_s/I_{ot}$[Note3]		dB	17
SS-RSRP[Note3]	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6		-84
SSB_RP[Note3]	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6		-84
Io[Note3]	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96
	Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition			AWGN
Antenna Configuration and Correlation Matrix			1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			

Note 3:	$\hat{E}_s/I_{ot}$, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.5.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 2	
			Test 1	Test 2
E-UTRA RF channel number			1	
Duplex mode	Config 1, 2, 3		FDD	
	Config 4, 5, 6		TDD	
TDD special subframe configuration[Note1]	Config 1, 2, 3		N/A	
	Config 4, 5, 6		6	
TDD uplink-downlink configuration[Note1]	Config 1, 2, 3		N/A	
	Config 4, 5, 6		1	
$BW_{channel}$		MHz	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]			-	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]	Config 1, 2, 3		5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
	Config 4, 5, 6		5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]	Config 1, 2, 3		5 MHz: OP.19 FDD 10 MHz: OP.6 FDD 20 MHz: OP.14 FDD	
	Config 4, 5, 6		5 MHz: OP.10 TDD 10 MHz: OP.2 TDD 20 MHz: OP.8 TDD	
PBCH_RA		dB	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	Bands FDD_A [Note 9], TDD_A	dBm/15kHz	-91.65	-117
	Bands FDD_B1, FDD_B2 [Note 10]			-116.5
	Bands FDD_C, TDD_C			-116
	Bands FDD_D			-115.5
	Bands FDD_E, FDD_F [Note 7], TDD_E			-115
	Bands FDD_G [Note 8]			-114
	Bands FDD_H			-113.5
$\hat{E}_s/N_{oc}$		dB	10	-4
$\hat{E}_s/I_{ot}$[Note5]		dB	10	-4
RSRP[Note5]	Bands FDD_A [Note 9], TDD_A	dBm/15kHz	-81.65	-121

	Bands FDD_B1, FDD_B2 Note 10			-120.5
	Bands FDD_C, TDD_C			-120
	Bands FDD_D			-119.5
	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
SCH_RP Note5	Bands FDD_A Note 9, TDD_A	dBm/15kHz	-81.65	-121
	Bands FDD_B1, FDD_B2 Note 10			-120.5
	Bands FDD_C, TDD_C			-120
	Bands FDD_D			-119.5
	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
Io Note5	Bands FDD_A Note 9, TDD_A	dBm/Ch BW	-53.45 + 10log($N_{RB,c}$/50)	-87.76 + 10log($N_{RB,c}$/50)
	Bands FDD_B1, FDD_B2 Note 10			-87.26 + 10log($N_{RB,c}$/50)
	Bands FDD_C, TDD_C			-86.76 + 10log($N_{RB,c}$/50)
	Bands FDD_D			-86.26 + 10log($N_{RB,c}$/50)
	Bands FDD_E, FDD_F Note 7, TDD_E			-85.76 + 10log($N_{RB,c}$/50)
	Bands FDD_G Note 8			-84.76 + 10log($N_{RB,c}$/50)
	Bands FDD_H			-84.26 + 10log($N_{RB,c}$/50)
Propagation Condition			AWGN	
Antenna Configuration and Correlation Matrix			1x2	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15]. Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz. Note 8: Except Band 29. Note 9: Except Band 32, Band 75 and Band 76. Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.				

A.6.7.5.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRP measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.2.

A.6.7.6 E-UTRAN RSRQ

A.6.7.6.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.3 for SA inter-RAT E-UTRAN RSRQ measurements.

A.6.7.6.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.6.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRQ are tested by using the parameters in A.6.7.6.1.2-2 and A.6.7.6.1.2-3.

Table A.6.7.6.1.2-1: Inter-RAT E-UTRAN RSRQ supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.6.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		N/A
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
$BW_{channel}$	Config 1, 4	MHz	10: $N_{RB,c}$ = 52 (FDD)
	Config 2, 5		10: $N_{RB,c}$ = 52 (TDD)
	Config 3, 6		40: $N_{RB,c}$ = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement channel	Config 1, 4		SR.1.1 FDD
	Config 2, 5		SR.1.1 TDD
	Config 3, 6		SR.2.1 TDD
CORSET reference channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
BWP configurations	Initial DL BWP		DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
OCNG pattern^{Note1}			OP.1
SMTC configuration			SMTC.1
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS			
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMRS			
N_{oc}^{Note2}		dBm/15 kHz	-104
N_{oc}^{Note2}	Config 1, 2, 4, 5	dBm/SCS	-104
	Config 3, 6		-101
$\hat{E}_s/N_{oc}$		dB	dB
$\hat{E}_s/I_{ot}$^{Note3}		dB	dB
SS-RSRQ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6		-84
SSB_RP^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6		-84
Io^{Note3}	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96
	Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition			AWGN
Antenna Configuration and Correlation Matrix			1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant			

	over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	$\hat{E}_s/I_{ot}$, SS-RSRQ, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.6.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter	Unit	Cell 2		
		Test 1	Test 2	Test 3

E-UTRA RF channel number			1		
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6		TDD		
TDD special subframe configuration[Note1]	Config 1, 2, 3		N/A		
	Config 4, 5, 6		6		
TDD uplink-downlink configuration[Note1]	Config 1, 2, 3		N/A		
	Config 4, 5, 6		1		
$BW_{channel}$		MHz	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100		
PDSCH parameters: DL Reference Measurement Channel[Note2]			-		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]	Config 1, 2, 3		5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD		
	Config 4, 5, 6		5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD		
OCNG Patterns[Note2]	Config 1, 2, 3		5 MHz: OP.19 FDD 10 MHz: OP.6 FDD 20 MHz: OP.14 FDD		
	Config 4, 5, 6		5 MHz: OP.10 TDD 10 MHz: OP.2 TDD 20 MHz: OP.8 TDD		
PBCH_RA		dB	0		
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA[Note3]					
OCNG_RB[Note3]					
N_{oc}[Note4]	Bands FDD_A [Note 9], TDD_A	dBm/15kHz	-83	-104.70	-119.5
	Bands FDD_B1, FDD_B2 [Note 10]				-119
	Bands FDD_C, TDD_C				-118.5
	Bands FDD_D				-118
	Bands FDD_E, FDD_F [Note 7], TDD_E				-117.5
	Bands FDD_G [Note 8]				-116.5
	Bands FDD_H				-116
$\hat{E}_s/N_{oc}$		dB	-1.75	-4.0	-4.0
$\hat{E}_s/I_{ot}$[Note5]		dB	-1.75	-4.0	-4.0
RSRP[Note5]	Bands FDD_A [Note 9], TDD_A	dBm/15kHz	-84.75	-108.70	-123.5
	Bands FDD_B1, FDD_B2 [Note 10]				-123
	Bands FDD_C, TDD_C				-122.5
	Bands FDD_D				-122
	Bands FDD_E, FDD_F				-121.5

	Note 7, TDD_E				
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
RSRQNote5	Bands FDD_A Note 9, TDD_A	dB	-14.76	-16.25	-16.25
	Bands FDD_B1, FDD_B2 Note 10				
	Bands FDD_C, TDD_C				
	Bands FDD_D				
	Bands FDD_E, FDD_F Note 7, TDD_E				
	Bands FDD_G Note 8				
	Bands FDD_H				
IoNote5	Bands FDD_A Note 9, TDD_A	dBm/Ch BW	-53 + 10log($N_{RB,c}$ /50)	-75.46 + 10log($N_{RB,c}$ /50)	-90.26 + 10log($N_{RB,c}$ /50)
	Bands FDD_B1, FDD_B2 Note 10				-89.76 + 10log($N_{RB,c}$ /50)
	Bands FDD_C, TDD_C				-89.26 + 10log($N_{RB,c}$ /50)
	Bands FDD_D				-88.76 + 10log($N_{RB,c}$ /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-88.26 + 10log($N_{RB,c}$ /50)
	Bands FDD_G Note 8				-87.26 + 10log($N_{RB,c}$ /50)
	Bands FDD_H				-86.76 + 10log($N_{RB,c}$ /50)
Propagation Condition			AWGN		
Antenna Configuration and Correlation Matrix			1x2		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Except Band 29.
Note 9: Except Band 32, Band 75 and Band 76.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.6.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRQ measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.3.

A.6.7.7 E-UTRAN RS-SINR

A.6.7.7.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.4 for SA inter-RAT E-UTRAN RS-SINR measurements.

A.6.7.7.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.7.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RS-SINR are tested by using the parameters in A.6.7.7.1.2-2 and A.6.7.7.1.2-3.

Table A.6.7.7.1.2-1: Inter-RAT E-UTRAN RS-SINR supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.7.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		N/A
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
$BW_{channel}$	Config 1, 4	MHz	10: $N_{RB,c}$ = 52 (FDD)
	Config 2, 5		10: $N_{RB,c}$ = 52 (TDD)
	Config 3, 6		40: $N_{RB,c}$ = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement channel	Config 1, 4		SR.1.1 FDD
	Config 2, 5		SR.1.1 TDD
	Config 3, 6		SR.2.1 TDD
CORSET reference channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
BWP configurations	Initial DL BWP		DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
OCNG pattern^{Note1}			OP.1
SMTC configuration			SMTC.1
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS			
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMRS			
N_{oc}^{Note2}		dBm/15 kHz	-104
N_{oc}^{Note2}	Config 1, 2, 4, 5	dBm/SCS	-104
	Config 3, 6		-101
$\hat{E}_s/N_{oc}$		dB	17
$\hat{E}_s/I_{ot}^{Note3}$		dB	17
SS-RS-SINR^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6		-84
SSB_RP^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6		-84
Io^{Note3}	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96
	Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition			AWGN
Antenna Configuration and Correlation Matrix			1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			

Note 3:	$\hat{E}_s/I_{ot}$, SS-RS-SINR, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.7.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 2		
			Test 1	Test 2	Test 3
E-UTRA RF channel number			1		
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6		TDD		
TDD special subframe configuration[Note1]	Config 1, 2, 3		N/A		
	Config 4, 5, 6		6		
TDD uplink-downlink configuration[Note1]	Config 1, 2, 3		N/A		
	Config 4, 5, 6		1		
$BW_{channel}$		MHz	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100		
PDSCH parameters: DL Reference Measurement Channel[Note2]			-		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]	Config 1, 2, 3		5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD		
	Config 4, 5, 6		5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD		
OCNG Patterns[Note2]	Config 1, 2, 3		5 MHz: OP.19 FDD 10 MHz: OP.6 FDD 20 MHz: OP.14 FDD		
	Config 4, 5, 6		5 MHz: OP.10 TDD 10 MHz: OP.2 TDD 20 MHz: OP.8 TDD		
PBCH_RA		dB	0		
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA[Note3]					
OCNG_RB[Note3]					
N_{oc}[Note4]	Bands FDD_A [Note 9], TDD_A	dBm/15kHz	-88	-108.50	-119.5
	Bands FDD_B1, FDD_B2 [Note 10]				-119
	Bands FDD_C, TDD_C				-118.5
	Bands FDD_D				-118
	Bands FDD_E, FDD_F [Note 7], TDD_E				-117.5
	Bands FDD_G [Note 8]				-116.5
	Bands FDD_H				-116
CRS $\hat{E}_s/N_{oc1}$		dB	-1.75	20.0	-4.0
CRS $\hat{E}_s/I_{ot}$[Note5]		dB	-1.75	20.0	-4.0
RSRP[Note5]	Bands FDD_A [Note 9], TDD_A	dBm/15kHz	-89.75	-88.50	-123.5

	Bands FDD_B1, FDD_B2 Note 10				-123
	Bands FDD_C, TDD_C				-122.5
	Bands FDD_D				-122
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
RS-SINR Note5	Bands FDD_A Note 9, TDD_A	dB	-1.75	20	-4.0
	Bands FDD_B1, FDD_B2 Note 10				
	Bands FDD_C, TDD_C				
	Bands FDD_D				
	Bands FDD_E, FDD_F Note 7, TDD_E				
	Bands FDD_G Note 8				
	Bands FDD_H				
Io Note5	Bands FDD_A Note 9, TDD_A	dBm/Ch BW	-53.79 + 10log($N_{RB,c}$/50)	-60.56 + 10log($N_{RB,c}$/50)	-93.48 + 10log($N_{RB,c}$/50)
	Bands FDD_B1, FDD_B2 Note 10				-92.98 + 10log($N_{RB,c}$/50)
	Bands FDD_C, TDD_C				-92.48 + 10log($N_{RB,c}$/50)
	Bands FDD_D				-91.98 + 10log($N_{RB,c}$/50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-91.48 + 10log($N_{RB,c}$/50)
	Bands FDD_G Note 8				-90.48 + 10log($N_{RB,c}$/50)
	Bands FDD_H				-89.98 + 10log($N_{RB,c}$/50)
Propagation Condition			AWGN		
Antenna Configuration and Correlation Matrix			1x2		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 4a: Void.
Note 5: CRS $\hat{E}_s/I_{ot}$, RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Except Band 29.
Note 9: Except Band 32, Band 75 and Band 76.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.7.1.3 Test Requirements

The SA inter-RAT E-UTRAN RS-SINR measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.4.

A.6.7.8 CLI measurements

A.6.7.8.1 SA SRS-RSRP measurement accuracy with FR1 serving cell

A.6.7.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.22.1.1 with the testing configurations for NR cells in Table A.6.7.8.1.1-1.

Table A.6.7.8.1.1-1: Applicable NR configurations for FR1 SRS-RSRP accuracy test

Config	Description
1	15kHz SRS SCS, 10 MHz bandwidth, TDD duplex mode
2	30kHz SRS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.8.1.2 Test parameters

In this set of test cases there is one cell in the test, FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.8.1.2-1 below. The test parameter for the (virtual) neighbor cell UE transmitting SRS are given in Table A.6.7.8.1.2-2.

Before the test UE is configured to perform SRS-RSRP measurement. During the test, the test system transmits SRS resources for measurement in the DL slots according to the SRS configuration in Table A.6.7.8.1.2-3. There is no measurement gap configured in the test. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on SRS symbol to be transmitted and on 1 data symbol before SRS to be transmitted.

Table A.6.7.8.1.2-1: FR1 test parameters for SRS-RSRP accuracy for PCell

Parameter		Config	Unit	Test 1	Test 2	Test 3
SSB GSCN		1~2		freq1	freq1	freq1
Duplex mode		1~2		TDD	TDD	TDD
TDD configuration		1		TDDConf.1.1	TDDConf.1.1	TDDConf.1.1
		2		TDDConf.2.1	TDDConf.2.1	TDDConf.2.1
$BW_{channel}$		1	MHz	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
		2		40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel		1		SR.1.1 TDD	SR.1.1 TDD	SR.1.1 TDD
		2		SR.2.1 TDD	SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference Channel		1		CR.1.1 TDD	CR.1.1 TDD	CR.1.1 TDD
		2		CR.2.1 TDD	CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET Reference Channel		1		CCR.1.1 TDD	CCR.1.1 TDD	CCR.1.1 TDD
		2		CCR.2.1 TDD	CCR.2.1 TDD	CCR.2.1 TDD
SSB configuration		1		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
		2		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
OCNG Patterns		1~2		OP.1	OP.1	OP.1
TRS configuration		1		TRS.1.1 TDD	TRS.1.1 TDD	TRS.1.1 TDD
		2		TRS.1.2 TDD	TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration		1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration		1~2		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration		1~2		SMTC.1	SMTC.1	SMTC.1
Time offset between DL from serving cell and SRS from test system		1~2	μs	17.67	17.67	17.67
EPRE ratio of PSS to SSS		1~2	dB	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
N_{oc} Note2	NR_TDD_FR1_A NOTE 3	1	dBm/15kHz	-106	-88	-114
	NR_TDD_FR1_C					-113
	NR_TDD_FR1_D					-112.5
	NR_TDD_FR1_E					-112
	NR_TDD_FR1_A NOTE 5	2		Not applicable Note 4	-91	-114
	NR_TDD_FR1_C					-113
	NR_TDD_FR1_D					-112.5
	NR_TDD_FR1_E					-112

N_{oc} Note2	NR_TDD_FR1_A NOTE 3	1	dBm/SRS SCS	-106	-88	-114
	NR_TDD_FR1_C					-113
	NR_TDD_FR1_D					-112.5
	NR_TDD_FR1_E					-112
	NR_TDD_FR1_A NOTE 3	2		Not applicable Note 4	-88	-111
	NR_TDD_FR1_C					-110
	NR_TDD_FR1_D					-109.5
	NR_TDD_FR1_E					-109

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification
Note 4: Test 1 is not used when testing with 30kHz SSB SCS

Table A.6.7.8.1.2-2: FR1 test parameters for SRS-RSRP accuracy for neighbour cell UE

Parameter		Config	Unit	Test 1	Test 2	Test 3
N_{oc} Note2	NR_TDD_FR1_A NOTE 5	1	dBm/15kHz	-106	-88	-114
	NR_TDD_FR1_C					-113
	NR_TDD_FR1_D					-112.5
	NR_TDD_FR1_E					-112
	NR_TDD_FR1_A NOTE 5	2		Not applicable Note 6	-91	-114
	NR_TDD_FR1_C					-113
	NR_TDD_FR1_D					-112.5
	NR_TDD_FR1_E					-112
N_{oc} Note2	NR_TDD_FR1_A NOTE 5	1	dBm/SRS SCS	-106	-88	-114
	NR_TDD_FR1_C					-113
	NR_TDD_FR1_D					-112.5
	NR_TDD_FR1_E					-112
	NR_TDD_FR1_A NOTE 5	2		Not applicable Note 6	-88	-111
	NR_TDD_FR1_C					-110
	NR_TDD_FR1_D					-109.5
	NR_TDD_FR1_E					-109
$\hat{E}_s/I_{ot}$ on SRS		1~2	dB	1	1	1
SRS RSRP Note3	NR_TDD_FR1_A NOTE 5	1	dBm/SRS SCS	-105	-87	-113
	NR_TDD_FR1_C					-112
	NR_TDD_FR1_D					-111.5
	NR_TDD_FR1_E					-111
	NR_TDD_FR1_A NOTE 5	2		Not applicable Note 6	-87	-110
	NR_TDD_FR1_C					-109
	NR_TDD_FR1_D					-108.5
	NR_TDD_FR1_E					-108
Io Note3	NR_TDD_FR1_A NOTE 5	1	dBm/9.36 MHz	-74.51	-56.51	-82.51
	NR_TDD_FR1_C					-81.51
	NR_TDD_FR1_D					-81.01
	NR_TDD_FR1_E					-79.51
	NR_TDD_FR1_A NOTE 5	2	dBm/38.16 MHz	Not applicable Note 6	-53.42	-76.42
	NR_TDD_FR1_C					-75.42
	NR_TDD_FR1_D					-74.92
	NR_TDD_FR1_E					-74.42
$\hat{E}_s/N_{oc}$ on SRS		1~2	dB	1	1	1
Propagation condition		1~2		AWGN	AWGN	AWGN
Antenna configuration		1~2		1x2	1x2	1x2
SRS configuration		1		SRSConf.1	SRSConf.1	SRSConf.1
		2		SRSConf.2	SRSConf.2	SRSConf.2

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of the test.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver

	antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification
Note 6:	Test 1 is not used when testing with 30kHz SSB SCS

Table A.6.7.8.1.2-3: SRS configuration parameters for FR1 SRS-RSRP accuracy

	Field	SRSConf.1	SRSConf.2
SRS-ResourceSet	srs-ResourceSetId	0	0
	srs-ResourceIdList	0	0
	resourceType	Periodic	Periodic
	Usage	Codebook	Codebook
SRS-Resource	SRS-ResourceId	0	0
	nrofSRS-Ports	Port1	Port1
	transmissionComb	n2	n2
	combOffset-n2	0	0
	cyclicShift-n2	0	0
	resourceMapping startPosition	0	0
	resourceMapping nrofSymbols	n1	n1
	resourceMapping repetitionFactor	n1	n1
	freqDomainPosition	0	0
	freqDomainShift	0	0
	freqHopping c-SRS	12	12
	freqHopping b-SRS	0	0
	freqHopping b-hop	0	0
	groupOrSequenceHopping	Neither	Neither
	resourceType	Periodic	Periodic
	periodicityAndOffset-p	sl20, 9	sl40, 19
	sequenceId	0	0

A.6.7.8.1.3 Test Requirements

The SRS-RSRP measurement accuracy shall fulfil the requirements in clauses 10.1.22.1.1.

A.6.7.8.2 SA CLI-RSSI measurement accuracy with FR1 serving cell

A.6.7.8.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CLI-RSSI measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.22.2.1 with the testing configurations for NR cells in Table A.6.7.8.2.1-1.

Table A.6.7.8.2.1-1: Applicable NR configurations for FR1 CLI-RSSI accuracy test

Config	Description
1	NR 15 kHz SRS SCS, 10 MHz bandwidth, TDD duplex mode
2	NR 30kHz SRS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.8.2.2 Test parameters

In this set of test cases there is one cell in the test, the FR1 PSCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.8.2.2-1 below.

Before the test UE is configured to perform CLI-RSSI measurement. There is no measurement gap configured in the test. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on symbols for CLI-RSSI resource and on 1 data symbol before. The CLI-RSSI measurement resource configuration is in Table A.6.7.8.2.2-2.

Table A.6.7.8.2.2-1: FR1 test parameters for CLI-RSSI accuracy

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD configuration	1		TDDConf.1.1
	2		TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52
	2		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 TDD
	2		SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 TDD
	2		CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 TDD
	2		CCR.2.1 TDD
SSB configuration	1		SSB.1 FR1
	2		SSB.2 FR1
OCNG Patterns Note6	1~2		OP.1
TRS configuration	1		TRS.1.1 TDD
	2		TRS.1.2 TDD
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~2		SMTC.1
Time offset between DL from serving cell and OCNG from test system	1~2	µs	17.67
EPRE ratio of PSS to SSS	1~2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
N_{oc} on CLI-RSSI measurement resource Note2	1	dBm/15kHz	-106
	2		-106
N_{oc} on CLI-RSSI measurement resource Note2	1	dBm/ BWP SCS	-106

	2		-103
$\hat{E}_s/I_{ot}$ on CLI-RSSI measurement resource	1~2	dB	-Infinity
RSRP on CLI-RSSI measurement resource Note3	1~2	dBm/ BWP SCS	-Infinity
Io on CLI-RSSI measurement resource Note3	1	dBm/9.36 MHz	-78.05
	2	dBm/38.16 MHz	-71.96
Io on CLI-RSSI measurement resource Note3	1	dBm/1.08 MHz	-87.43
	2		-87.44
$\hat{E}_s/N_{oc}$ on CLI-RSSI measurement resource	1~2	dB	-Infinity
Propagation condition	1~2		AWGN
Antenna configuration	1~2		1x2
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification Note 6: OCNG is not transmitted in the CLI-RSSI measurement resources.			

Table A.6.7.8.2.2-2: CLI-RSSI measurement resource configuration for FR1 CLI-RSSI accuracy

	Field	Config	SRSConf.1
CLI-RSSI measurement resource	rssi-ResourceId	1~2	0
	rssi-SCS	1	15kHz
		2	30kHz
	startPRB	1~2	0
	nrofPRBs	1	52
		2	106
	startPosition	1~2	3
	nrofSymbols	1~2	11
	rssi-PeriodicityAndOffset	1	sl20, 9
		2	sl40, 19

A.6.7.8.2.3 Test Requirements

The CLI-RSSI measurement accuracy shall fulfil the requirements in clauses 10.1.22.2.1.

A.6.7.9 L1-SINR measurement for beam reporting

A.6.7.9.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off

A.6.7.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.8.4.1 and clause 10.1.27.1 for L1-SINR measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.9.1.1-1.

Table A.6.7.9.1.1-1: Applicable NR configurations for FR1 L1-SINR test with CSI-RS based CMR and no dedicated IMR configured

Config	Description
1	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.9.1.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.9.1.2-1 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.6.7.9.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.6.7.9.1.2-1: FR1 CSI-RS based L1-SINR test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
Duplex mode	1		FDD	FDD
	2		TDD	TDD
	3		TDD	TDD
TDD Configuration	1		N/A	N/A
	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 FDD
	2		SR.1.1 TDD	SR.1.1 TDD
	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 FDD
	2		CR.1.1 TDD	CR.1.1 TDD
	3		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 FDD
	2		CCR.1.1 TDD	CCR.1.1 TDD
	3		CCR.2.1 TDD	CCR.2.1 TDD
SSB configuration	1		SSB.1 FR1	SSB.1 FR1
	2		SSB.1 FR1	SSB.1 FR1
	3		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~3		OP.1	OP.1
TRS configuration	1		TRS.1.1 FDD	TRS.1.1 FDD
	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
	2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportConfigType	1~3		periodic	periodic
reportQuantity-r16	1~3		cri-SINR-r16	cri-SINR-r16
nrofReportedRS	1~3		2	2
L1-SINR reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS	1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				

N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15kHz	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-91.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{E}_s/I_{ot}$		1~3	dB	10	-3
CSI-RS RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-84.65	-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-118
	NR_FDD_FR1_F				-117.5
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-81.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114

	NR_FDD_FR1_H				-113.5
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/9.36 MHz	-56.28	-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D				-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_F				-84.78
	NR_FDD_FR1_G				-84.28
	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3	dBm/38.16 MHz	-50.19	-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C				-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D				-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_F				-78.69
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	-3
Propagation condition		1~3		AWGN	AWGN
Antenna configuration		1~3		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.					

A.6.7.9.1.3 Test Requirements

The L1-SINR measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.27.1.

A.6.7.9.2 L1-SINR measurement with SSB based CMR and dedicated IMR

A.6.7.9.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.8.4.2 and clause 10.1.27.2 for L1-SINR measurements with SSB based CMR and dedicated CSI-RS based IMR, with the testing configurations for NR cells in Table A.6.7.9.2.1-1.

Table A.6.7.9.2.1-1: Applicable NR configurations for FR1 L1-SINR measurement test with SSB based CMR and CSI-RS based IMR

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.9.2.2 Test parameters

In this set of test cases there one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.9.2.2-1 below. The absolute accuracy of L1-SINR measurements are tested by using the parameters in Table A.6.7.9.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources and one CSI-RS resource set with two CSI-RS resource. UE is configured to perform RLM and BFD measurement based on the SSB resources 0 and 1. UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-RS resources as IMR.

Table A.6.7.9.2.2-1: FR1 SSB based L1-SINR test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
Duplex mode	1		FDD	FDD
	2		TDD	TDD
	3		TDD	TDD
TDD Configuration	1		N/A	N/A
	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 FDD
	2		SR.1.1 TDD	SR.1.1 TDD
	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 FDD
	2		CR.1.1 TDD	CR.1.1 TDD
	3		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 FDD
	2		CCR.1.1 TDD	CCR.1.1 TDD
	3		CCR.2.1 TDD	CCR.2.1 TDD
SSB configuration	1		SSB.3 FR1	SSB.3 FR1
	2		SSB.3 FR1	SSB.3 FR1
	3		SSB.4 FR1	SSB.4 FR1
CSI-RS configuration	1		CSI-RS 1.1A FDD	CSI-RS 1.1A FDD
	2		CSI-RS 1.1A TDD	CSI-RS 1.1A TDD
	3		CSI-RS 2.1A TDD	CSI-RS 2.1A TDD
OCNG Patterns	1~3		OP.1	OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
TRS configuration	1		TRS.1.1 FDD	TRS.1.1 FDD
	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
reportConfigType	1~3		periodic	periodic
reportQuantity-r16	1~3		ssb-Index-SINR-r16	ssb-Index-SINR-r16
Number of reported RS	1~3		2	2
L1-SINR reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS	1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				

EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15kHz	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/SSB SCS	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-91.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{E}_s/I_{ot}$		1~3	dB	10	0
$\hat{E}_s/N_{oc}$		1~6	dB	10	0

SSB RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/SSB SCS	-84.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-81.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
CSI-RS RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-84.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-81.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-113
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/9.36 MHz	-56.28	-86.04
	NR_FDD_FR1_B				-85.54
	NR_TDD_FR1_C				-85.04
	NR_FDD_FR1_D, NR_TDD_FR1_D				-84.54
	NR_FDD_FR1_E, NR_TDD_FR1_E				-84.04
	NR_FDD_FR1_F				-83.54
	NR_FDD_FR1_G				-83.04

	NR_FDD_FR1_H				-82.54
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3	dBm/38.16 MHz	-50.19	-79.94
	NR_FDD_FR1_B				-79.44
	NR_TDD_FR1_C				-78.94
	NR_FDD_FR1_D, NR_TDD_FR1_D				-78.44
	NR_FDD_FR1_E, NR_TDD_FR1_E				-77.94
	NR_FDD_FR1_F				-77.44
	NR_FDD_FR1_G				-76.94
	NR_FDD_FR1_H				-76.44
Propagation condition		1~3		AWGN	AWGN
Antenna configuration		1~3		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.					

A.6.7.9.2.3 Test Requirements

The L1-SINR measurement accuracy for SSB#0+CSI-RS#0 and SSB#1+CSI-RS#1 of Cell 1 shall fulfil the requirements in clauses 10.1.27.2.

A.6.7.9.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR

A.6.7.9.3.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will partly verify the requirements in Clauses 9.8.4.3 and clause 10.1.27.3 for L1-SINR measurements based on CSI-RS as CMR and CSI-IM as IMR with the testing configurations for NR cells in Table A.6.7.9.3.1-1.

Table A.6.7.9.3.1-1: Applicable NR configurations for FR1 L1-SINR measurement test with CSI-RS based CMR and CSI-IM based IMR

Config	Description
1	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.9.3.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.9.3.2-1 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.6.7.9.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources and one CSI-IM resource set with two CSI-IM resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB. UE is configured to perform L1-SINR measurement based on the configured CSI-RS as CMR and CSI-IM as IMR.

Table A.6.7.9.3.2-1: FR2 L1-SINR measurement test with CSI-RS based CMR and CSI-IM based IMR

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
Duplex mode	1		FDD	FDD
	2		TDD	TDD
	3		TDD	TDD
TDD Configuration	1		N/A	N/A
	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	2		10: $N_{RB,c}$ = 52	10: $N_{RB,c}$ = 52
	3		40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 FDD
	2		SR.1.1 TDD	SR.1.1 TDD
	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 FDD
	2		CR.1.1 TDD	CR.1.1 TDD
	3		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 FDD
	2		CCR.1.1 TDD	CCR.1.1 TDD
	3		CCR.2.1 TDD	CCR.2.1 TDD
SSB configuration	1		SSB.1 FR1	SSB.1 FR1
	2		SSB.1 FR1	SSB.1 FR1
	3		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~3		OP.1	OP.1
TRS configuration	1		TRS.1.1 FDD	TRS.1.1 FDD
	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
CSI-RS configuration as CMR	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
	2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
CSI-IM configuration as IMR	1		CSI-IM 1.3 FDD	CSI-IM 1.3 FDD
	2		CSI-IM 1.3 TDD	CSI-IM 1.3 TDD
	3		CSI-IM 2.3 TDD	CSI-IM 2.3 TDD
reportConfigType	1~3		periodic	periodic
reportQuantity-r16	1~3		cri-SINR-r16	cri-SINR-r16
nrofReportedRS	1~3		2	2
L1-RSRP reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS	1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				

EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15kHz	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-94.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-91.65	-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_F				-111.5
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{E}_s/I_{ot}$		1~3	dB	10	-3
CSI-RS RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/CSI-RS SCS	-84.65	-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-118
	NR_FDD_FR1_F				-117.5
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3		-81.65	-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5

	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_F				-114.5
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2	dBm/9.36 MHz	-56.28	-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D				-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_F				-84.78
	NR_FDD_FR1_G				-84.28
	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3	dBm/38.16 MHz	-50.19	-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C				-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D				-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_F				-78.69
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	-3
Propagation condition		1~3		AWGN	AWGN
Antenna configuration		1~3		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.					

A.6.7.9.3.3 Test Requirements

The L1-SINR measurement accuracy for CSI-RS#0+CSI-IM#0 and CSI-RS#1+CSI-IM# of Cell 1 shall fulfil the requirements in clause 10.1.27.3.

A.6.7.10 CSI-RSRP

A.6.7.10.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.9.10.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.3.1 and 10.1.2.3.2 for CSI-RS intra-frequency measurements.

A.6.7.9.10.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.10.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.10.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.10.1.2-1: CSI-RSRP intra frequency supported test configurations

Config	Description
1	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

Table A.6.7.10.1.2-2: CSI-RSRP intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID			489	0	489	0	489	0
SSB ARFCN			freq1		freq1		freq1	
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
BWP BW	Config 1		10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
Downlink initial BWP configuration			DLBWP.0.1					
Downlink dedicated BWP configuration			DLBWP.1.1					
Uplink initial BWP configuration			ULBWP.0.1					
Uplink dedicated BWP configuration			ULBWP.1.1					
TRS configuration	Config 1		TRS.1.1 FDD	NA	TRS.1.1 FDD	NA	TRS.1.1 FDD	NA
	Config 2		TRS.1.1 TDD	NA	TRS.1.1 TDD	NA	TRS.1.1 TDD	NA
	Config 3		TRS.1.2 TDD	NA	TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-	CR.1.1 FDD	-
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD	
Control channel RMC	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR2.1 TDD		CCR2.1 TDD		CCR2.1 TDD	

SSB configuration	Config 1			SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 2			SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 3			SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
Time offset with Cell 1	Config 1,2		µs	-	4.7	-	4.7	-	4.7
	Config 3		µs	-	2.35	-	2.35	-	2.35
SMTC configuration	Config 1			SMTC.2					
	Config 2,3			SMTC.1					
CSI-RS configuration for RRM	Config 1			CSI-RS.RRM.FR1.1 FDD					
	Config 2			CSI-RS.RRM.FR1.1 TDD					
	Config 3			CSI-RS.RRM.FR1.2 TDD					
OCNG Patterns				OCNG pattern 1					
PDSCH/PDCCH subcarrier spacing	Config 1,2		kHz	15 kHz					
	Config 3			30kHz					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/15KhZ	-106		-88		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not applicable Note 5		-94		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
N_{oc} Note2	Config 1,2		dBm/SCS	-106		-88		Same as Noc/15kHz	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not applicable Note 5		-91		-111	
		NR_FDD_FR1_B						-110.5	
		NR_TDD_FR1_C						-110	
		NR_FDD_FR1_D,						-109.5	

		NR_TDD_FR1_D							
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_F						-108.5	
		NR_FDD_FR1_G						-108	
		NR_FDD_FR1_H						-107.5	
$\hat{E}_s/I_{ot}$			dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
$\hat{E}_s/N_{oc}$			dB	6	1	6	1	3	0
CSI-RSRP[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-100	-105	-82	-87	-111.00	-114.00
		NR_FDD_FR1_B						-110.50	-113.50
		NR_TDD_FR1_C						-110.00	-113.00
		NR_FDD_FR1_D, NR_TDD_FR1_D						-109.50	-112.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109.00	-112.00
		NR_FDD_FR1_F						-108.50	-111.50
		NR_FDD_FR1_G						-108.00	-111.00
		NR_FDD_FR1_H						-107.50	-110.50
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not applicable[Note 5]	Not applicable[Note 5]	-85	-90	-108.00	-111.00
		NR_FDD_FR1_B						-107.50	-110.50
		NR_TDD_FR1_C						-107.00	-110.00
		NR_FDD_FR1_D, NR_TDD_FR1_D						-106.50	-109.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						-106.00	-109.00
		NR_FDD_FR1_F						-105.50	-108.50
		NR_FDD_FR1_G						-105.00	-108.00
		NR_FDD_FR1_H						-104.50	-107.50
Io[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-70.09		-52.09		-80.03	
		NR_FDD_FR1_B						-79.53	
		NR_TDD_FR1_C						-79.03	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-78.53	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-78.03	
		NR_FDD_FR1_F						-77.53	
		NR_FDD_FR1_G						-77.03	
		NR_FDD_FR1_H						-76.53	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	Not applicable[Note 5]-		-51.99		-73.94	

		NR_FDD_FR1_B				-73.44
		NR_TDD_FR1_C				-72.94
		NR_FDD_FR1_D, NR_TDD_FR1_D				-72.44
		NR_FDD_FR1_E, NR_TDD_FR1_E				-71.94
		NR_FDD_FR1_F				-71.44
		NR_FDD_FR1_G				-70.94
		NR_FDD_FR1_H				-70.44
Propagation condition			-	AWGN		
Antenna configuration				1x2		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: Subtest 1 is not used when testing with 30kHz SSB and CSI-RS SCS. Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification						

A.6.7.10.1.3 Test Requirements

The CSI-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.3.1 and relative requirement in clause 10.1.2.3.2.

A.6.7.10.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.9.10.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.3.1 and 10.1.4.3.2 for CSI-RS inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.9.2.1-1.

Table A.6.7.10.2.1-1: Applicable NR configurations for FR1 inter-frequency CSI-RSRP accuracy test

Config	Description
1	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.6.7.10.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.10.2.2-1 below. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.10.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.10.2.2-1: CSI-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~3		freq1	freq2	freq1	freq2
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	2		10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
Duplex mode	1		FDD		FDD	
	2		TDD		TDD	
	3		TDD		TDD	
TDD configuration	1		N/A		N/A	
	2		TDDConf.1.1		TDDConf.1.1	
	3		TDDConf.2.1		TDDConf.2.1	
PDSCH Reference measurement channel	1		SR.1.1 FDD	-	SR.1.1 FDD	-
	2		SR.1.1 TDD		SR.1.1 TDD	
	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	-	CR.1.1 FDD	-
	2		CR.1.1 TDD	-	CR.1.1 TDD	-
	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
SSB configuration	1		SSB.1 FR1		SSB.1 FR1	
	2		SSB.1 FR1		SSB.1 FR1	
	3		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~3		OP.1		OP.1	
TRS configuration	1		TRS.1.1 FDD	-	TRS.1.1 FDD	
	2		TRS.1.1 TDD		TRS.1.1 TDD	
	3		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	
Time offset with Cell 1	1,2	μs	-	4.7	-	4.7
	3	μs	-	2.35	-	2.35
SMTC configuration	1		SMTC.2		SMTC.2	
	2,3		SMTC.1		SMTC.1	
CSI-RS configuration for RRM	1		CSI-RS.RRM.FR1.1 FDD		CSI-RS.RRM.FR1.1 FDD	
	2		CSI-RS.RRM.FR1.1 TDD		CSI-RS.RRM.FR1.1 TDD	
	3		CSI-RS.RRM.FR1.2 TDD		CSI-RS.RRM.FR1.2 TDD	
EPRE ratio of PSS to SSS	1~3	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH						

DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG DMRS to SSSNote 1							
EPRE ratio of OCNG to OCNG DMRS Note 1							
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15 kHz	-94.65		(N_{oc} for Channel 2 +8dB)	-115
	NR_FDD_FR1_B						-114.5
	NR_TDD_FR1_C						-114
	NR_FDD_FR1_D, NR_TDD_FR1_D						-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113
	NR_FDD_FR1_F						-112.5
	NR_FDD_FR1_G						-112
	NR_FDD_FR1_H						-111.5
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	1,2	dBm/SSB SCS	-94.65		(N_{oc} for Channel 2 +8dB)	-115
	NR_FDD_FR1_B						-114.5
	NR_TDD_FR1_C						-114
	NR_FDD_FR1_D, NR_TDD_FR1_D						-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113
	NR_FDD_FR1_F						-112.5
	NR_FDD_FR1_G						-112
	NR_FDD_FR1_H						-111.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	3		-91.65		(N_{oc} for Channel 2 +8dB)	-112.00
	NR_FDD_FR1_B						-112.50
	NR_TDD_FR1_C						-112.00
	NR_FDD_FR1_D, NR_TDD_FR1_D						-111.50
	NR_FDD_FR1_E, NR_TDD_FR1_E						-111.00
	NR_FDD_FR1_F						-110.50
	NR_FDD_FR1_G						-110.00
	NR_FDD_FR1_H						-110.50
$\hat{E}_s/I_{ot}$		1~3	dB	10	10	13	-3
CSI-	NR_FDD_FR1_A	1,2	dBm/SC	-84.65		(RSRP for	-118.00

RSRP[Note3]	, NR_TDD_FR1_A NOTE 5,		S			Cell 2 +25dB)	
	NR_FDD_FR1_B						-117.50
	NR_TDD_FR1_C						-117.00
	NR_FDD_FR1_D, NR_TDD_FR1_D						-116.50
	NR_FDD_FR1_E, NR_TDD_FR1_E						-116.00
	NR_FDD_FR1_F						-115.50
	NR_FDD_FR1_G						-115.00
	NR_FDD_FR1_H						-114.50
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	3		-81.65		(RSRP for Cell 2 +25dB)	-115.00
	NR_FDD_FR1_B						-114.50
	NR_TDD_FR1_C						-114.00
	NR_FDD_FR1_D, NR_TDD_FR1_D						-113.50
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113.00
	NR_FDD_FR1_F						-112.50
	NR_FDD_FR1_G						-112.00
	NR_FDD_FR1_H						-111.50
Io[Note3]	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	1,2	dBm/ 9.36MHz	-56.28		Io for Channel 2 +19.75dB	-85.28
	NR_FDD_FR1_B						-84.78
	NR_TDD_FR1_C						-84.28
	NR_FDD_FR1_D, NR_TDD_FR1_D						-83.78
	NR_FDD_FR1_E, NR_TDD_FR1_E						-83.28
	NR_FDD_FR1_F						-82.78
	NR_FDD_FR1_G						-82.28
	NR_FDD_FR1_H						-81.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,	3	dBm/ 38.16MHz	-50.19		Io for Channel 2 +19.75dB	-79.19
	NR_FDD_FR1_B						-78.69
	NR_TDD_FR1_C						-78.19
	NR_FDD_FR1_D, NR_TDD_FR1_D						-77.69
	NR_FDD_FR1_E, NR_TDD_FR1_E						-77.19
	NR_FDD_FR1_F						-76.69
	NR_FDD_FR1_G						-76.19
	NR_FDD_FR1_H						-75.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	10	13	-3

Propagation condition	1~3	-	AWGN	AWGN
Antenna configuration	1~3		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.				

A.6.7.10.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.3.1 and relative requirement in clause 10.1.4.3.2.

A.6.7.11 CSI-RSRQ

A.6.7.11.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.2.

A.6.7.11.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.11.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.11.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.11.1.2-1: Intra frequency CSI-RSRQ supported test configurations

Config	Description
1	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.11.1.2-2: CSI-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1 Cell 1	Test 1 Cell 2	Test 2 Cell 1	Test 2 Cell 2	Test 3 Cell 1	Test 3 Cell 2
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
Gap Pattern ID			0					
BWP configuration	Initial DL BWP		DLBWP.0.1					
	Dedicated DL BWP		DLBWP.1.1					
	Initial UL BWP		ULBWP.0.1					
	Dedicated UL BWP		ULBWP.1.1					
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD	
Control Channel RMC	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD		CCR.2.1 TDD	
TRS Configuration	Config 1		TRS.1.1 FDD	-	TRS.1.1 FDD	-	TRS.1.1 FDD	-
	Config 2		TRS.1.1 TDD		TRS.1.1 TDD		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns			OP. 1					
Time offset with Cell 1	Config 1	µs	-	4.7	-	4.7	-	4.7
	Config 2,3	µs	-	2.35	-	2.35	-	2.35
CSI-RS	Config 1		CSI-RS.RRM.FR1.1 FDD					

configuration for RRM	Config 2			CSI-RS.RRM.FR1.1 TDD					
	Config 3			CSI-RS.RRM.FR1.2 TDD					
SMTC configuration	Config 1			SMTC.2					
	Config 2,3			SMTC.1					
SSB configuration	Config 1,2			SSB.1 FR1					
	Config 3			SSB.2 FR1					
PDSCH/PDCCH subcarrier spacing	Config 1,2		kHz	15 kHz					
	Config 3			30kHz					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/15kHz	-85		-101		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-91		-		-114	
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112	
		NR_FDD_FR1_F						-111.5	
		NR_FDD_FR1_G						-111	
		NR_FDD_FR1_H						-110.5	
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-85		-101		-114 -113.5 -113 -112.5 -112 -111.5 -111 -110.5	
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							
		NR_FDD_FR1_D, NR_TDD_FR1_D							
		NR_FDD_FR1_E, NR_TDD_FR1_E							
		NR_FDD_FR1_F							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
	Config	NR_FDD_FR1_A,		-88		-		-111	

	3	NR_TDD_FR1_A NOTE 6							
		NR_FDD_FR1_B						-110.5	
		NR_TDD_FR1_C						-110	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-109.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_F						-108.5	
		NR_FDD_FR1_G						-108	
		NR_FDD_FR1_H						-107.5	
$\hat{E}_s/I_{ot}$			dB	-1.76		-4.7		-5..46	-5.46
$\hat{E}_s/N_{oc}$			dB	3	3	-2.9	-2.9	-4	-4
SS-RSRP/ CSI-RSRP[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ SCS	-82	-82	-103.9	-103.9	-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
		NR_TDD_FR1_C						-117	-117
		NR_FDD_FR1_D, NR_TDD_FR1_D						-116.5	-116.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-116	-116
		NR_FDD_FR1_F						-115.5	-115.5
		NR_FDD_FR1_G						-115	-115
		NR_FDD_FR1_H						-114.5	-114.5
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-85	-85	-	-	-115	-115
		NR_FDD_FR1_B						-114.5	-114.5
		NR_TDD_FR1_C						-114	-114
		NR_FDD_FR1_D, NR_TDD_FR1_D						-113.5	-113.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-113	-113
		NR_FDD_FR1_F						-112.5	-112.5
		NR_FDD_FR1_G						-112	-112
		NR_FDD_FR1_H						-111.5	-111.5
SS-RSRQ/CSI-RSRQ[Note3]		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							
		NR_FDD_FR1_D, NR_TDD_FR1_D							
		NR_FDD_FR1_E, NR_TDD_FR1_E							
		NR_FDD_FR1_F							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
Io[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-50		-70		-83.5	
		NR_FDD_FR1_B						-83	
		NR_TDD_FR1_C						-82.5	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-82	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-81.5	
		NR_FDD_FR1_F						-81	

		NR_FDD_FR1_G						-80.5	
		NR_FDD_FR1_H						-80	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 38.16 MHz	-50		-		-77.4	
		NR_FDD_FR1_B						-76.9	
		NR_TDD_FR1_C						-76.4	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-75.9	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-75.4	
		NR_FDD_FR1_F						-74.9	
		NR_FDD_FR1_G						-74.4	
		NR_FDD_FR1_H						-73.9	
Propagation condition			-	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration				1x2	1x2	1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: NR operating band groups are as defined in clause 3.5.2. Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.									

A.6.7.11.1.3 Test Requirements

The CSI-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.2.

A.6.7.11.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.11.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.2.1 and 10.1.9.2.2.

A.6.7.11.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.11.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.11.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.11.2.2-1: CSI-RSRQ Inter frequency CSI-RSRQ supported test configurations

Config	Description
1	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.11.2.2-2: CSI-RSRQ Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: $N_{RB,c}$ = 106					
Gap pattern ID	Config 1,2,3		0					
BWP BW	Config 1		10: $N_{RB,c}$ = 52					
	Config 2		10: $N_{RB,c}$ = 52					
	Config 3		40: NRB,c = 106					
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1,4		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2,5		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR2.1 TDD		CCR2.1 TDD		CCR2.1 TDD	
TRS Configuration	Config 1		TRS.1.1 FDD	-	TRS.1.1 FDD	-	TRS.1.1 FDD	-
	Config 2		TRS.1.1 TDD		TRS.1.1 TDD		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns			OCNG pattern 1					
Time offset with Cell 1	Config 1,2	µs	-	4.7	-	4.7	-	4.7
	Config 3	µs	-	2.35	-	2.35	-	2.35
CSI-RS configuration for RRM	Config 1		CSI-RS.RRM.FR1.1 FDD					
	Config 2		CSI-RS.RRM.FR1.1 TDD					

	Config 3			CSI-RS.RRM.FR1.2 TDD					
SSB configuration	Config 1,2			SSB.1 FR1					
	Config 3			SSB.2 FR1					
SMTC configuration	Config 1,2			SMTC.2					
	Config 3			SMTC.1					
PDSCH/PDCCH subcarrier spacing	Config 1,2		kHz	15 kHz					
	Config 3			30 kHz					
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			dB	0	0	0	0	0	0
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-80.18		-106		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
N_{oc} Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-86.27		-113		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-80.18		-106		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-83.27		-110		-113	
		NR_FDD_FR1_B						-112.5	
		NR_TDD_FR1_C						-112	

		NR_FDD_FR1_D NR_TDD_FR1_D						-111.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	
		NR_FDD_FR1_F						-110.5	
		NR_FDD_FR1_G						-110	
		NR_FDD_FR1_H						-109.5	
$\hat{E}_s/I_{ot}$			dB	-1.75		-1.75		3	-1.75
$\hat{E}_s/N_{oc}$			dB	-1.75		-1.75		3	-1.75
SS-RSRP/CSI-RSRP[Note3]	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A[NOTE 6]	dBm/SCS	-81.93	-81.93	-107.75	-107.75	-113	-117.75
		NR_FDD_FR1_B						-112.5	-117.25
		NR_TDD_FR1_C						-112	-116.75
		NR_FDD_FR1_D NR_TDD_FR1_D						-111.5	-116.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	-115.75
		NR_FDD_FR1_F						-110.5	-115.2
		NR_FDD_FR1_G						-110	-114.75
		NR_FDD_FR1_H						-109.5	-114.25
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A[NOTE 6]		-85.02	-85.02	-111.75	-111.75	-110	-114.75
		NR_FDD_FR1_B						-109.5	-114.25
		NR_TDD_FR1_C						-109	-113.75
		NR_FDD_FR1_D NR_TDD_FR1_D						-108.5	-113.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	-112.75
		NR_FDD_FR1_F						-107.5	-112.2
		NR_FDD_FR1_G						-107	-111.75
		NR_FDD_FR1_H						-106.5	-111.25
SS-RSRQ/CSI-RSRQ[Note3]		NR_FDD_FR1_A NR_TDD_FR1_A[NOTE 6]	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76T
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							

		NR_FDD_FR1_D NR_TDD_FR1_D							
		NR_FDD_FR1_E NR_TDD_FR1_E							
		NR_FDD_FR1_F							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
Io[Note3]	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-50		-75.83		-83.28	-85.83
		NR_FDD_FR1_B						-82.78	-85.33
		NR_TDD_FR1_C						-82.28	-84.83
		NR_FDD_FR1_D NR_TDD_FR1_D						-81.78	-84.33
		NR_FDD_FR1_E NR_TDD_FR1_E						-81.28	-83.83
		NR_FDD_FR1_F						-80.78	-83.33
		NR_FDD_FR1_G						-80.28	-82.83
		NR_FDD_FR1_H						-79.78	-82.33
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-50		-76.73		-77.19	-79.73
		NR_FDD_FR1_B						-76.69	-79.23
		NR_TDD_FR1_C						-76.19	-78.73
		NR_FDD_FR1_D NR_TDD_FR1_D						-75.69	-78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	-77.73
		NR_FDD_FR1_F						-74.69	-77.23
		NR_FDD_FR1_G						-74.19	-76.73
		NR_FDD_FR1_H						-73.69	-76.53
Propagation condition			-	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration				1x2	1x2	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRQ/CSI-RSRQ, SS-RSRP/CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: NR operating band groups are as defined in clause 3.5.2.
Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.6.7.11.2.3 Test Requirements

The CSI-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.2.1 and 10.1.9.2.2.

A.6.7.12 CSI-SINR

A.6.7.12.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.12.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.2.1.

A.6.7.12.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.11.1.2-1. The absolute accuracy of CSI-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.11.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.12.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations

Config	Description
1	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.12.1.2-2: CSI-SINR Intra frequency test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1		freq1	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
Downlink initial BWP configuration			DLBWP.0.1			
Downlink dedicated BWP configuration			DLBWP.1.1			
Uplink initial BWP configuration			ULBWP.0.1			
Uplink dedicated BWP configuration			ULBWP.1.1			
DRX Cycle configuration		ms	Not Applicable			
TRS configuration	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR.2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns			OP.1			
CSI-RSSI-Measurement			Not Applicable			
Time offset with Cell 1	Config 1,2	μs	-	2.35	-	2.35
	Config 3	μs	-	1.17	-	1.17
SSB configuration	Config 1,2		SSB.1 FR1			
	Config 3		SSB.2 FR1			
SMTC configuration	Config 1		SMTC.2			
	Config 2,3		SMTC.1			
CSI-RS for mobility	Config 1		CSI-RS.RRM.FR1.1 FDD			
	Config 2		CSI-RS.RRM.FR1.1 TDD			
	Config 3		CSI-RS.RRM.FR1.2 TDD			
PDSCH/PDCCH	Config 1,2	kHz	15			

subcarrier spacing	Config 3			30			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			dB	0	0	0	0
N_{oc} Note2		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/15kHz	-93		-116	
		NR_FDD_FR1_B				-115.5	
		NR_TDD_FR1_C				-115	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-114.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-114	
		NR_FDD_FR1_F				-113.5	
		NR_FDD_FR1_G				-113	
		NR_FDD_FR1_H				-112.5	
N_{oc} Note2	Config 1,2		dBm/SCS	-93		Same as Noc for 15 kHz	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-90		-113	
		NR_FDD_FR1_B				-112.5	
		NR_TDD_FR1_C				-112	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-111.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-111	
		NR_FDD_FR1_F				-110.5	
		NR_FDD_FR1_G				-110	
		NR_FDD_FR1_H				-109.5	
$\hat{E}_s/I_{ot}$			dB	0	-3.19	-5.46	-5.46
$\hat{E}_s/N_{oc}$			dB	4.54	2.66	-4	-4
CSI-RSRP Note3	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-88.46	-90.34	-120	-120
		NR_FDD_FR1_B				-119.5	-119.5
		NR_TDD_FR1_C				-119	-119
		NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5	-118.5
		NR_FDD_FR1_E, NR_TDD_FR1_E				-118	-118
		NR_FDD_FR1_F				-117.5	-117.5
		NR_FDD_FR1_G				-117	-117
		NR_FDD_FR1_H				-116.5	-116.5
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-85.46	-87.34	-117	-117
		NR_FDD_FR1_B				-116.5	-116.5
		NR_TDD_FR1_C				-116	-116
		NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5	-115.5
		NR_FDD_FR1_E, NR_TDD_FR1_E				-115	-115
		NR_FDD_FR1_F				-114.5	-114.5

		NR_FDD_FR1_G				-114	-114
		NR_FDD_FR1_H				-113.5	-113.5
CSI-SINR Note3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dB	0	-3.19	-5.46	-5.46
		NR_FDD_FR1_B					
		NR_TDD_FR1_C					
		NR_FDD_FR1_D, NR_TDD_FR1_D					
		NR_FDD_FR1_E, NR_TDD_FR1_E					
		NR_FDD_FR1_F					
		NR_FDD_FR1_G					
		NR_FDD_FR1_H					
Io Note3	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-57.5		-85.51	
		NR_FDD_FR1_B				-85.01	
		NR_TDD_FR1_C				-84.51	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-84.01	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-83.51	
		NR_FDD_FR1_F				-83.01	
		NR_FDD_FR1_G				-82.51	
		NR_FDD_FR1_H				-82.01	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	-51.41		-79.41	
		NR_FDD_FR1_B				-78.91	
		NR_TDD_FR1_C				-78.41	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-77.91	
		NR_FDD_FR1_E, NR_TDD_FR1_E				-77.41	
		NR_FDD_FR1_F				-76.91	
		NR_FDD_FR1_G				-76.41	
		NR_FDD_FR1_H				-75.91	
Propagation condition			-	AWGN			
Antenna configuration			-	1x2			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: CSI-SINR, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: NR operating band groups are as defined in clause 3.5.2.
Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.6.7.12.1.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.2.1.

A.6.7.12.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.12.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.2.1 and 10.1.14.2.2.

A.6.7.12.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.12.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.12.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.12.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations

Config	Description
1	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB and CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB and CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.6.7.12.2.2-2: CSI-SINR Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1		FDD					
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable					
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
Downlink initial BWP configuration			DLBWP.0.1					
Downlink dedicated BWP configuration			DLBWP.1.1					
Uplink initial BWP configuration			ULBWP.0.1					
Uplink dedicated BWP configuration			ULBWP.1.1					
DRX Cycle configuration		ms	Not Applicable					
TRS configuration	Config 1		TRS.1.1 FDD					
	Config 2		TRS.1.1 TDD					
	Config 3		TRS.1.2 TDD					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns			OP.1					
CSI-RSSI-Measurement			Not Applicable					
Time offset with Cell 1	Config 1,2	μs	-	2.35	-	2.35	-	2.35
	Config 3	μs	-	1.17	-	1.17	-	1.17
SMTC configuration	Config 1		SMTC.2					
	Config 2,3		SMTC.1					
SSB configuration	Config 1,2		SSB.1 FR1					
	Config 3		SSB.2 FR1					
CSI-RS for mobility	Config 1		CSI-RS.RRM.FR1.1 FDD					
	Config 2		CSI-RS.RRM.FR1.1 TDD					

		Config 3		CSI-RS.RRM.FR1.2 TDD					
PDSCH/PDCCH subcarrier spacing		Config 1,2	kHz	15					
		Config 3		30					
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			dB	0	0	0	0	0	0
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-88		-108.5		-119.5	
		NR_FDD_FR1_B						-119	
		NR_TDD_FR1_C						-118.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-118	
		NR_FDD_FR1_E NR_TDD_FR1_E						-117.5	
		NR_FDD_FR1_F						-117	
		NR_FDD_FR1_G						-116.5	
		NR_FDD_FR1_H						-116	
N_{oc} Note2	Config 1,2 N		dBm/15kHz	-88		-108.5		Same as Noc for 15kHz T	
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-85		-105.5		-116.5	
		NR_FDD_FR1_B						-116	
		NR_TDD_FR1_C						-115.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-115	
		NR_FDD_FR1_E NR_TDD_F						-114.5	

		R1_E							
		NR_FDD_FR1_F						-114	
		NR_FDD_FR1_G						-114.5	
		NR_FDD_FR1_H						-113	
$\hat{E}_s/I_{ot}$			dB	-1.75	-1.75	15	15	-4.0	-4.0
$\hat{E}_s/N_{oc}$			dB	-1.75		15		-4.0	
CSI-RSRP[Note3]	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A[NOTE 6]	dBm/SCS	-89.75		-93.5		-123.5	
		NR_FDD_FR1_B						-123	
		NR_TDD_FR1_C						-122.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-122	
		NR_FDD_FR1_E NR_TDD_FR1_E						-121.5	
		NR_FDD_FR1_F						-121	
		NR_FDD_FR1_G						-120.5	
		NR_FDD_FR1_H						-120	
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A[NOTE 6]		-86.75		-90.5		-120.5	
		NR_FDD_FR1_B						-120	
		NR_TDD_FR1_C						-119.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-119	
		NR_FDD_FR1_E NR_TDD_FR1_E						-118.5	
		NR_FDD_FR1_F						-118	
		NR_FDD_FR1_G						-117.5	
		NR_FDD_FR1_H						-117	
CSI-SINR[Note3]		NR_FDD_FR1_A NR_TDD_FR1_A[NOTE 6]	dB	-1.75		15		-4.0	
		NR_FDD_F							

		R1_B				
		NR_TDD_FR1_C				
		NR_FDD_FR1_D NR_TDD_FR1_D				
		NR_FDD_FR1_E NR_TDD_FR1_E				
		NR_FDD_FR1_F				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
Io[Note3]	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A [NOTE 6]	dBm/9.36MHz	-57.83	-65.4	-90.09
		NR_FDD_FR1_B				-89.59
		NR_TDD_FR1_C				-89.09
		NR_FDD_FR1_D NR_TDD_FR1_D				-88.59
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09
		NR_FDD_FR1_F				-87.59
		NR_FDD_FR1_G				-87.09
		NR_FDD_FR1_H				-86.59
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A [NOTE 6]	dBm/38.16MHz	-51.73	-59.3	-84
		NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C				-83
		NR_FDD_FR1_D NR_TDD_FR1_D				-82.5
		NR_FDD_FR1_E NR_TDD_FR1_E				-82
		NR_FDD_FR1_F				-81.5
		NR_FDD_FR1_G				-81
		NR_FDD_FR1_H				-80.5

Propagation condition	-	AWGN
Antenna configuration	-	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: CSI-SINR, CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: NR operating band groups are as defined in clause 3.5.2. Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.		

A.6.7.12.2.3 Test Requirements

The CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.2.1 and 10.1.14.2.2.

A.6.7.13 RSTD measurements

A.6.7.13.1 RSTD measurement accuracy test case for single positioning frequency layer

A.6.7.13.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.6.7.13.1.1-1.

Table A.6.7.13.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cells. Both cells are on the same NR RF channel in FR1. GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9.2.

Table A.6.7.13.1.1-2: RSTD accuracy test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
PRS ARFCN	1~3		freq1	Freq1	freq1	Freq1
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	2		10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
Duplex mode	1		FDD		FDD	
	2		TDD		TDD	
	3		TDD		TDD	
TDD configuration	1		N/A		N/A	
	2		TDDConf.1.1		TDDConf.1.1	
	3		TDDConf.2.1		TDDConf.2.1	
PDSCH Reference measurement channel	1		SR.1.1 FDD	-	SR.1.1 FDD	-
	2		SR.1.1 TDD		SR.1.1 TDD	
	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	-	CR.1.1 FDD	-
	2		CR.1.1 TDD	-	CR.1.1 TDD	-
	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
SSB configuration	1		SSB.1 FR1		SSB.1 FR1	
	2		SSB.1 FR1		SSB.1 FR1	
	3		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~3		OP.1		OP.1	
TRS configuration	1		TRS.1.1 FDD	-	TRS.1.1 FDD	
	2		TRS.1.1 TDD		TRS.1.1 TDD	
	3		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	
Time offset with Cell 1	1	μs	-	3	-	3
	2,3		-	3	-	3
SMTC configuration	1		SMTC.2		SMTC.2	
	2,3		SMTC.1		SMTC.1	
PRS configuration	1		PRS.1.1 FR1		PRS.1.2 FR1	
	2		PRS.1.1 FR1		PRS.1.2 FR1	
	3		PRS.2.1 FR1		PRS.2.2 FR1	
PRS muting info	1~3		‘10’	‘01’	‘10’	‘01’
Expected RSTD	1, 2, 3	μs	N/A	3	N/A	3
Expected RSTD uncertainty	1, 2, 3	μs	N/A	5	N/A	5
EPRE ratio of PSS to SSS	1~3	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						

EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
N_{oc} Note2	1,2	dBm/SCS	-98		-98	
	3		-95		-95	
$\hat{E}_s/I_{ot}$	1~3	dB	-6	-13	-6	-13
PRS-RSRP Note3	1,2	dBm/SCS	-104	-111	-104	-111
	3		-101	-108	-101	-108
Io Note3	1,2	dBm/ 9.36MHz	-69.07	-69.83	-69.07	-69.83
	3	dBm/ 38.16MHz	-62.98	-63.74	-62.98	-63.74
$\hat{E}_s/N_{oc}$	1~3	dB	-6	-13	-6	-13
Propagation condition	1~3	-	AWGN		AWGN	
Antenna configuration	1~3		1x2		1x2	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.						

A.6.7.13.1.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

A.6.7.13.2 RSTD measurement accuracy test case for dual positioning frequency layer

A.6.7.13.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.6.7.13.2.1-1.

Table A.6.7.13.2.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell on NR RF channel #1 in FR1. Cell 2 is a neighbour cell on a different NR RF channel #2 in FR1. GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9.2.

Table A.6.7.13.2.1-2: RSTD accuracy test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
PRS ARFCN	1~3		freq1	freq2	freq1	freq2
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	2		10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
Duplex mode	1		FDD		FDD	
	2		TDD		TDD	
	3		TDD		TDD	
TDD configuration	1		N/A		N/A	
	2		TDDConf.1.1		TDDConf.1.1	
	3		TDDConf.2.1		TDDConf.2.1	
PDSCH Reference measurement channel	1		SR.1.1 FDD	-	SR.1.1 FDD	-
	2		SR.1.1 TDD		SR.1.1 TDD	
	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	-	CR.1.1 FDD	-
	2		CR.1.1 TDD	-	CR.1.1 TDD	-
	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
SSB configuration	1		SSB.1 FR1		SSB.1 FR1	
	2		SSB.1 FR1		SSB.1 FR1	
	3		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~3		OP.1		OP.1	
TRS configuration	1		TRS.1.1 FDD	-	TRS.1.1 FDD	
	2		TRS.1.1 TDD		TRS.1.1 TDD	
	3		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	
Time offset with Cell 1	1	µs	-	3	-	3
	2,3		-	3	-	3
SMTC configuration	1		SMTC.2		SMTC.2	
	2,3		SMTC.1		SMTC.1	
PRS configuration	1		PRS.1.1 FR1		PRS.1.2 FR1	
	2		PRS.1.1 FR1		PRS.1.2 FR1	
	3		PRS.2.1 FR1		PRS.2.2 FR1	
Expected RSTD	1, 2, 3	µs	N/A	3	N/A	3
Expected RSTD uncertainty	1, 2, 3	µs	N/A	5	N/A	5
EPRE ratio of PSS to SSS	1~3	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
N_{oc} Note2	1,2	dBm/	-98		-98	

	3	SCS	-95		-95	
$\hat{E}_s/I_{ot}$	1~3	dB	-6	-13	-6	-13
PRS-RSRP[Note3]	1,2	dBm/SCS	-104	-111	-104	-111
	3		-101	-108	-101	-108
Io[Note3]	1,2	dBm/9.36MHz	-69.07	-69.83	-69.07	-69.83
	3	dBm/38.16MHz	-62.98	-63.74	-62.98	-63.74
$\hat{E}_s/N_{oc}$	1~3	dB	-6	-13	-6	-13
Propagation condition	1~3	-	AWGN		AWGN	
Antenna configuration	1~3		1x2		1x2	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.						

A.6.7.13.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

A.6.7.14 PRS-RSRP measurements

A.6.7.14.1 SA: measurement accuracy with PRS in FR1

A.6.7.14.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

A.6.7.14.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.14.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in A.6.7.14.1.2-2. In all test cases, Cell 1 is the PCell.

Table A.6.7.14.1.2-1: PRS-RSRP supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

Table A.6.7.14.1.2-2: PRS-RSRP test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
Cell ID			489	0	489	0
SSB ARFCN			freq1		freq1	
Duplex mode	Config 1		FDD			
	Config 2,3		TDD			
TDD configuration	Config 1		Not Applicable			
	Config 2		TDDConf.1.1			
	Config 3		TDDConf.2.1			
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
BWP BW	Config 1		10: $N_{RB,c}$ = 52			
	Config 2		10: $N_{RB,c}$ = 52			
	Config 3		40: $N_{RB,c}$ = 106			
Downlink initial BWP configuration			DLBWP.0.1			
Downlink dedicated BWP configuration			DLBWP.1.1			
Uplink initial BWP configuration			ULBWP.0.1			
Uplink dedicated BWP configuration			ULBWP.1.1			
TRS configuration	Config 1		TRS.1.1 FDD	NA	TRS.1.1 FDD	NA
	Config 2		TRS.1.1 TDD	NA	TRS.1.1 TDD	NA
	Config 3		TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle		ms	Not Applicable			
Measurement gap			GP#24 or GP#0 Note 7			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	-	SR.1.1 FDD	-
	Config 2		SR.1.1 TDD		SR.1.1 TDD	
	Config 3		SR2.1 TDD		SR2.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-
	Config 2		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD	
Control channel RMC	Config 1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	Config 2		CCR.1.1 TDD		CCR.1.1 TDD	
	Config 3		CCR2.1 TDD		CCR2.1 TDD	
PRS configuration	Config 1		PRS.1.2 FR1	PRS.1.2 FR1	PRS.1.2 FR1	PRS.1.2 FR1
	Config 2		PRS.1.2 FR1	PRS.1.2 FR1	PRS.1.2 FR1	PRS.1.2 FR1
	Config 3		PRS.2.2 FR1	PRS.2.2 FR1	PRS.2.2 FR1	PRS.2.2 FR1
SSB configuration	Config 1		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 2		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
	Config 3		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
Time offset with Cell 1	Config 1	ms	-	3	-	3
	Config 2,3	µs	-	3	-	3
SMTC configuration	Config 1		SMTC.2			

	Config 2,3			SMTC.1			
OCNG Patterns				OCNG pattern 1			
PDSCH/PDCCH subcarrier spacing	Config 1,2		kHz	15 kHz			
	Config 3			30 kHz			
EPRE ratio of PSS to SSS			dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H	dBm/15KhZ	-106		-88	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H		Not applicable Note 5		-94	
N_{oc} Note2	Config 1,2		dBm/SCS	-106		-88	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H		Not applicable Note 5		-91	
$\hat{E}_s/I_{ot}$			dB	2.46	-5.97	2.46	-5.97
$\hat{E}_s/N_{oc}$			dB	6	1	6	1
PRS-RSRP Note3	Config 1, 2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6,	dBm/SCS	-100	-105	-82	-87

		NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H					
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A[NOTE 6], NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H		Not applicable[Note 5]	Not applicable[Note 5]	-85	-90
Io[Note3]	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A[NOTE 6], NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H	dBm/9.36MHz	-70.09		-52.09	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A[NOTE 6], NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_F, NR_FDD_FR1_G, NR_FDD_FR1_H	dBm/38.16MHz	Not applicable[Note 5]		-51.99	
Propagation condition				AWGN			
Antenna configuration				1x2			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS.

Note 6:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification
Note 7:	GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.

A.6.7.14.1.3 Test Requirements

The PRS-RSRP measurement accuracy shall fulfil absolute requirement in clause 10.1.24.2.1 and relative requirement in clause 10.1.24.2.2.

A.6.7.15 UE Rx-Tx time difference measurements

A.6.7.15.1 UE Rx-Tx time difference measurement accuracy for single positioning frequency layer in FR1 SA

A.6.7.15.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.25.2. The test is conducted in AWGN propagation condition in FR1 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.6.7.15.1.1-1.

Table A.6.7.15.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR1.

The *NR-Multi-RTT-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #0 or ID #24 before the test.

The UE is configured to transmit SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

A.6.7.15.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.6.7.15.1.2-1. The SRS configuration parameters for UE Rx-Tx time difference test is given in Table A.6.7.15.1.2-2.

Table A.6.7.15.1.2-2: SRS configuration for UE Rx-Tx time difference measurement accuracy test

Parameter	Unit	Test configuration	Cell 1		Cell 2	
RF Channel Number		1,2,3	1		1	
Measurement gap		1,2,3	GP#24 or GP#0 Note 4			
DRX		1,2,3	OFF			
Time offset with Cell 1	μs	1, 2, 3	N/A		3	
TDD configuration		1	N/A		N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
		2	SR.1.1 TDD			
		3	SR.2.1 TDD			
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N/A	
		2	CR.1.1 TDD			
		3	CR.2.1 TDD			
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		N/A	
		2	CCR.1.1 TDD			
		3	CCR.2.1 TDD			
OCNG Patterns		1, 2, 3	OP.1		OP.1	
TRS Configuration		1	TRS.1.1 FDD		N/A	
		2	TRS.1.1 TDD			
		3	TRS.1.2 TDD			
Initial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		N/A	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.2 FR1		PRS.1.2 FR1	
		2	PRS.1.2 FR1		PRS.1.2 FR1	
		3	PRS.2.2 FR1		PRS.2.2 FR1	
N_{oc} Note 2	dBm/SCS	1	-98			
		2	-98			
		3	-95			
N_{oc} Note 2	dBm/15 kHz	1	-98			
		2				
		3				
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-2.41	-Infinity	-12.12
		2				
		3				
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-2	-Infinity	-10
		2				
		3				
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-100	-Infinity	-108
		2	-Infinity	-100	-Infinity	-108
		3	-Infinity	-97	-Infinity	-105
Io	dBm/9.36 MHz	1	N/A	-67.67	N/A	-67.67
	dBm/9.36 MHz	2		-67.67		-67.67
	dBm/38.16 MHz	3		-61.57		-61.57
Propagation Condition		1, 2, 3	AWGN			

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	PRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.

Table A.6.7.15.1.2-2: SRS configuration for UE Rx-Tx time difference measurement accuracy test

SRS-ResourceId	0
nrofSRS-Ports	Port1
transmissionComb	n4
combOffset-n4	0
cyclicShift-n4	0
resourceMapping startPosition	0
resourceMapping nrofSymbols	n4
resourceMapping repetitionFactor	n1
freqDomainPosition	0
freqDomainShift	0
freqHopping c-SRS	Matches $N_{RB,c}$
groupOrSequenceHopping	Neither
resourceType	Periodic
periodicityAndOffset-p	160*2^u, 20*2^u
sequenceId	0

A.6.7.15.1.3 Test requirements

The UE Rx-Tx time difference measurement time fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.2 for both Cell 1 and Cell 2.

A.7 NR standalone tests with one or more NR cells in FR2

A.7.1 SA: RRC_IDLE state mobility

A.7.1.1 Cell re-selection to NR

A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

A.7.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.7.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.1.2-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	
T2 end condition	Active cell		1, 2	Cell2	
	Neighbour cell		1, 2	Cell1	
Final condition	Active cell		1, 2	Cell1	
	Neighbour cell		1, 2	Cell2	
RF Channel Number			1, 2	1	
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC configuration			1, 2	SMTC.1	
DRX cycle length		s	1, 2	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2	Not configured	
T1		s	1, 2	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		s	1, 2	135	T2 needs to be defined so that cell re-selection reaction time is taken into account.
T3		s	1, 2	35	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.7.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1, 2	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC configuration		1	SR.3.1 TDD			SR.3.1 TDD		
		2	SR.3.1 TDD			SR.3.1 TDD		
RMSI CORESET RMC configuration		1	CR.3.1 TDD			CR.3.1 TDD		
		2	CR.3.1 TDD			CR.3.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD			CCR.3.1 TDD		
		2	CCR.3.1 TDD			CCR.3.1 TDD		
SSB configuration		1	SSB.3 FR2			SSB.7 FR2		
		2	SSB.4 FR2			SSB.8 FR2		
OCNG Pattern		1, 2	OP.4			OP.4		
$BW_{channel}$	MHz	1, 2	100: $N_{RB,c}$ = 66			100: $N_{RB,c}$ = 66		
Data RBs allocated		1, 2	66			66		
Initial DL BWP configuration		1, 2	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2	SSB			SSB		
Qrxlevmin	dBm/SCS	1	-138			-138		
		2	-135			-135		
Pcompensation	dB	1, 2	0			0		
$Qhyst_s$	dB	1, 2	0			0		
$Qoffset_{s, n}$	dB	1, 2	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2	SS-RSRP			SS-RSRP		
AoA setup		1, 2	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1		
$\hat{E}_s/I_{ot}$	dB	1	8	-3	1.5	-infinity	1.5	-3
		2						
Beam assumption Note 4		1,2	Rough					
N_{oc} Note2	dBm/SCS	1	-93					
		2	-90					
N_{oc} Note2	dBm/15 kHz	1	-102					
		2						
$\hat{E}_s/N_{oc}$	dB	1	8	-3	1.5	-infinity	1.5	-3
		2						
SS-RSRP Note3	dBm/SCS	1	-85	-96	-91.5	-infinity	-91.5	-96
		2	-82	-93	-88.5	-infinity	-88.5	-93
Io on SSB symbols of each cell	dBm/95.04 MHz	1	-59.37	-63.40	-62.47	-64.01	-62.47	-63.40
		2	-57.18	-62.86	-61.67	-64.01	-61.67	-62.86
Treselection	s	1, 2	0	0	0	0	0	0
SintrasearchP	dB	1, 2	50			50		
Propagation Condition		1, 2	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.1.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 1.

The cell re-selection delay to an already detected cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: T_{detect, NR_Intra} + T_{SI-NR}, and to an already detected cell can be expressed as: $T_{evaluate, NR\_ intra}$ + T_{SI-NR},

Where:

T_{detect, NR_Intra} See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate, NR\_ intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

A.7.1.1.2 Cell reselection to FR2 inter-frequency NR case

A.7.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.7.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.7.1.1.2.2-1, A.7.1.1.2.2-2 and A.7.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2.2-1: Supported test configurations

Configuration	Description for serving cell	Description for target cell
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell2	The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1
	Neighbour cell		1, 2	Cell1	
T1 end condition	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1, 2	Cell2	
T3 end condition	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
	Neighbour cell		1, 2	Cell1	
RF Channel Number			1, 2	1, 2	
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC configuration			1, 2	SMTC.1	
DRX cycle length		s	1, 2	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2	Not configured	
T1		s	1, 2	35	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3		s	1, 2	95	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1, 2	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC configuration		1, 2	SR.3.1 TDD			SR.3.1 TDD		
RMSI CORESET parameters		1, 2	CR.3.1 TDD			CR.3.1 TDD		
RMSI CORESET RMC configuration		1, 2	CCR.3.1 TDD			CCR.3.1 TDD		
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2	SSB			SSB		
Qrxlevmin	dBm/SCS	1	-140			-140		
		2	-137			-137		
Pcompensation	dB	1, 2	0			0		
$Qhyst_s$	dB	1, 2	0			0		
$Qoffset_{s, n}$	dB	1, 2	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2	SS-RSRP			SS-RSRP		
AoA setup		1, 2	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1		
Beam assumption Note 4		1,2	Rough			Rough		
$\hat{E}_s/I_{ot}$	dB	1	10.5	10.5	8	-10.5	-infinity	8.5
		2						
N_{oc} Note2	dBm/SCS	1	-93			-93		
		2	-90			-90		
N_{oc} Note2	dBm/15 kHz	1	-102			-102		
		2						
$\hat{E}_s/N_{oc}$	dB	1	10.5	10.5	8	-10.5	-infinity	8.5
		2						
SS-RSRP Note3	dBm/SCS	1	-83.5-	-83.5	-85	-103.5	-infinity	-84.5
		2	-80.5	-80.5	-82	-100.5	-infinity	-80.5
Io	dBm/95.04 MHz	1, 2	-54.05	-54.05	-55.37	-63.64	-54.01	-54.94
Treselection	s	1, 2	-54.05	-54.05	-55.37	-63.64	-54.01	-54.94
SnonintrasearchP	dB	1, 2	50			50		
$Thresh_{x, highP}$	dB	1, 2	48			48		
$Thresh_{serving, lowP}$	dB	1, 2	44			44		
$Thresh_{x, lowP}$	dB	1, 2	50			50		
Propagation Condition		1, 2	AWGN			AWGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 2.

The cell re-selection delay to a higher priority cell shall be less than 87 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 1.

The cell re-selection delay to a lower priority cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search} + T_{evaluate, NR\_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR\_inter} + T_{SI-NR}$,

Where:

$T_{higher\_priority\_search}$ See clause 4.2.2.7

$T_{evaluate, NR\_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 86.88 s, allow 87 s for the cell re-selection delay to a higher priority cell and 26.88 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 27 s.

A.7.1.1.3 Cell reselection to FR2 intra-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

A.7.1.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.2.

A.7.1.1.3.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.3.2-1, A.7.1.1.3.2-2 and A.7.1.1.3.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *lowMobilityEvalutation* is configured and fulfilled, where ($Srxlev_{Ref}$ – Srxlev) < $S_{SearchDeltaP}$. UE has not registered with network for the tracking area containing cell2.

Table A.7.1.1.3.2-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.7.1.1.3.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling low mobility criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	The UE camps on cell 1 in the initial phase
	Neighbour cells		1, 2	Cell2	
T1 end condition	Active cell		1, 2	Cell2	The UE reselects to cell 2 during T1 period
	Neighbour cells		1, 2	Cell1	
Final condition	Active cell		1, 2	Cell1	The UE reselects to cell 1 during T2 period
	Neighbour cells		1,2	Cell2	
RF Channel Number			1, 2	1	
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC configuration			1, 2	SMTC pattern 1	
DRX cycle length		s	1, 2	0.64	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2	Not configured	
T1		s	1, 2	100	
T2		s	1, 2	100	

Table A.7.1.1.3.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD		SR.3.1 TDD	
		2	SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
		2	CR.3.1 TDD		CR.3.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
		2	CCR.3.1 TDD		CCR.3.1 TDD	
SSB configuration		1	SSB.3 FR2		SSB.7 FR2	
		2	SSB.4 FR2		SSB.8 FR2	
OCNG Pattern		1, 2	OP.4		OP.4	
Initial DL BWP configuration		1, 2	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2	SSB		SSB	
Qrxlevmin	dBm/SCS	1	-140		-140	
		2	-137		-137	
$S_{SearchDeltaP}$	dB	1, 2	6		6	
$T_{SearchDeltaP}$	s	1,2	5		5	
Pcompensation	dB	1, 2	0		0	
$Qhyst_s$	dB	1, 2	0		0	
$Qoffset_{s,n}$	dB	1, 2	0		0	
Cell_selection_and_reselection_quality_measurement		1, 2	SS-RSRP		SS-RSRP	
AoA setup		1, 2	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1	
Beam assumption Note 4		1,2	Rough		Rough	
$\hat{E}_s/I_{ot}$	dB	1	-3	1.5	1.5	-3
		2				
N_{oc} Note2	dBm/SCS	1	-93			
		2	-90			
N_{oc} Note2	dBm/15 kHz	1	-102			
		2				
$\hat{E}_s/N_{oc}$	dB	1	-3	1.5	1.5	-3
		2				
SS-RSRP Note3	dBm/SCS	1	96	91.5	91.5	96
		2	93	-88.5	88.5	93
Io on SSB symbols of each cell	dBm/95.04 MHz	1	63.40	62.47	-62. 47	63.40
		2	62.86	61.67	-61.67	62.86

Treselection	s	1, 2	0	0	0	0
SintrasearchP	dB	1, 2	50		50	
Propagation Condition		1, 2	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.1.1.3.3 Test Requirements

The cell reselection delay to an already detected cell for UE fulfilling low mobility relaxed criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected cell shall be less than 79 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to an already detectable cell can be expressed as: $T_{evaluate, NR\_Intra} + T_{SI-NR}$,

Where:

$T_{evaluate, NR\_Intra}$ See Table 4.2.2.9.2-1 in clause 4.2.2.9,

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 78.08 s, allow 79s for the cell re-selection delay to an already detected cell for UE fulfilling low mobility criterion in the test case.

A.7.1.1.4 Cell reselection to FR2 intra-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

A.7.1.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements for UE configured with relaxed measurement criterion specified in clause 4.2.2.9.3.

A.7.1.1.4.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.4.2-1, A.7.1.1.4.2-2 and A.7.1.1.4.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. During T1 and T2, only criteria *cellEdgeEvaluation* is configured and fulfilled, where Srxlev> $S_{SearchThresholdP}$. UE has not registered with network for the tracking area containing cell2.

Table A.7.1.1.4.2-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

Table A.7.1.1.4.2-2: General test parameters for FR2 intra-frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	The UE camps on cell 1 in the initial phase
	Neighbour cells		1, 2	Cell2	
T1 end condition	Active cell		1, 2	Cell2	The UE reselects to cell 2 during T1 period
	Neighbour cells		1, 2	Cell1	
Final condition	Active cell		1, 2	Cell1	
	Neighbour cells		1,2	Cell2	
RF Channel Number			1, 2	1	
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC configuration			1, 2	SMTC pattern 1	
DRX cycle length		s	1, 2	0.64	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2	Not configured	
T1		s	1, 2	100	
T2		s	1, 2	100	

Table A.7.1.1.4.2-3: Cell specific test parameters for FR2 intra-frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD		SR.3.1 TDD	
		2	SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
		2	CR.3.1 TDD		CR.3.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
		2	CCR.3.1 TDD		CCR.3.1 TDD	
SSB configuration		1	SSB.3 FR2		SSB.7 FR2	
		2	SSB.4 FR2		SSB.8 FR2	
OCNG Pattern		1, 2	OP.4		OP.4	
Initial DL BWP configuration		1, 2	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2	SSB		SSB	
Qrxlevmin	dBm/SCS	1	-140		-140	
		2	-137		-137	
Pcompensation	dB	1, 2	0		0	
$Qhyst_s$	dB	1, 2	0		0	
$Qoffset_{s, n}$	dB	1, 2	0		0	
Cell_selection_and_reselection_quality_measurement		1, 2	SS-RSRP		SS-RSRP	
AoA setup		1, 2	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1	
Beam assumption Note 4		1,2	Rough		Rough	
$\hat{E}_s/I_{ot}$	dB	1	-3	1.5	1.5	-3
		2				
N_{oc} Note2	dBm/SCS	1	-93			
		2	-90			
N_{oc} Note2	dBm/15 kHz	1	-102			
		2				
$\hat{E}_s/N_{oc}$	dB	1	-3	1.5	1.5	-3
		2				
SS-RSRP Note3	dBm/SCS	1	-96	-91.5	-91.5	-96
		2	-93	-88.5	-88.5	-93
Io on SSB symbols of each cell	dBm/95.04 MHz	1	-63.40	-62.47	-62.47	-63.40
		2	-62.86	-61.67	-61.67	-62.86

Treselection	s	1, 2	0	0	0	0
$S_{SearchThresholdP}$		1, 2	35	35	35	35
SintrasearchP	dB	1, 2	50		50	
Propagation Condition		1, 2	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.1.1.4.3 Test Requirements

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 79 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to an already detected cell can be expressed as: $T_{evaluate,\ NR\_Intra} + T_{SI\text{-}NR}$,

Where:

$T_{evaluate,\ NR\_Intra}$ See Table 4.2.2.9.3-1 in clause 4.2.2.9,

$T_{SI\text{-}NR}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 78.08 s, allow 79s for the cell re-selection delay to an already detected cell for UE fulfilling not-at-cell edge criterion in the test case.

A.7.1.1.5 Cell reselection to FR2 inter-frequency NR case for UE fulfilling low mobility relaxed measurement criterion

A.7.1.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling low mobility criterion specified in clause 4.2.2.10.2.

A.7.1.1.5.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.5.2-1, A.7.1.1.5.2-2 and A.7.1.1.5.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with l*owMobilityEvalutation* criterion [2].

Table A.7.1.1.5.2-1: Supported test configurations

Configuration	Description for serving cell	Description for target cell
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.7.1.1.5.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling low mobility criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell2	The UE camps on cell2 and fulfils low mobility (*lowMobilityEvalutation* [2]) criterion.
	Neighbour cell		1, 2	Cell1	
T1 final condition	Active cell		1, 2	Cell1	The UE reselects to low priority cell1 during T1
	Neighbour cell		1, 2	Cell2	
T2 final condition	Active cell		1, 2	Cell2	The UE reselects to high priority cell2 during T2
	Neighbour cell			Cell1	
RF Channel Number			1, 2	1, 2	
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC configuration			1, 2	SMTC pattern 1	
DRX cycle length		s	1, 2	0.64	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2	Not configured	
T1		s	1, 2	85	T1 needs to be long enough to allow cell re-selection to already known cell1
T2		s	1, 2	85	T2 needs to be long enough to allow cell re-selection to already known cell2

Table A.7.1.1.5.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling low mobility criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1, 2	SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET parameters		1, 2	CR.3.1 TDD		CR.3.1 TDD	
RMSI CORESET RMC configuration		1, 2	CCR.3.1 TDD		CCR.3.1 TDD	
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2	SSB		SSB	
Qrxlevmin	dBm/SCS	1	-140		-140	
		2	-137		-137	
Pcompensation	dB	1, 2	0		0	
$Qhyst_s$	dB	1, 2	0		0	
$Qoffset_{s, n}$	dB	1, 2	0		0	
Cell_selection_and_reselection_quality_measurement		1, 2	SS-RSRP		SS-RSRP	
AoA setup		1, 2	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1	
Beam assumption Note 4		1, 2	Rough		Rough	
$\hat{E}_s/I_{ot}$	dB	1, 2	8	8	-3	8
N_{oc} Note2	dBm/SCS	1	-93		-93	
		2	-90		-90	
N_{oc} Note2	dBm/15 kHz	1, 2	-102		-102	
$\hat{E}_s/N_{oc}$	dB	1, 2	8	8	-3	8
SS-RSRP Note3	dBm/SCS	1	-85	-85	-96	-85
		2	-82	-82	-93	-82
Io	dBm/95.04 MHz	1	-55.37	-55.37	-62.25	-55.37
		2	-52.37	-52.37	-59.25	-52.37
TreselectionNR	s	1, 2	0		0	
SnonintrasearchP	dB	1, 2	50		Not sent	
$S_{SearchDeltaP}$	dB	1, 2	6		6	
$T_{SearchDeltaP}$	s	1, 2	5		5	
$Thresh_{x, high}$	dB	1, 2	48		48	
$Thresh_{serving, low}$	dB	1, 2	44		44	
$Thresh_{x, low}$	dB	1, 2	50		50	
Propagation Condition		1, 2	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.1.1.5.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling low mobility criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 79 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$

Where:

$T_{evaluate, NR\_ inter}$ See Table 4.2.2.10.2-1 in clause 4.2.2.10.2

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling low mobility criterion in the test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling low mobility criterion in the test case.

A.7.1.1.6 Cell reselection to FR2 inter-frequency NR case for UE fulfilling not-at-cell edge relaxed measurement criterion

A.7.1.1.6.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements for UE fulfilling not-at-cell edge criterion specified in clause 4.2.2.10.3.

A.7.1.1.6.2 Test Parameters

The test scenario comprises of 2 cells (Cell 1 and Cell 2) on 2 different NR carriers respectively as given in tables A.7.1.1.6.2-1, A.7.1.1.6.2-2 and A.7.1.1.6.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2. Cell 2 is of higher priority than Cell 1. The UE is configured with *cellEdgeEvaluation* criterion [2].

Table A.7.1.1.6.2-1: Supported test configurations

Configuration	Description for serving cell	Description for target cell
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.7.1.1.6.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case for UE fulfilling not-at-cell edge criterion

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell2	The UE camps on cell2 and fulfils not-at-cell edge (*cellEdgeEvaluation* [2]) criterion.
	Neighbour cell		1, 2	Cell1	
T1 final condition	Active cell		1, 2	Cell1	The UE reselects to low priority cell1 during T1
	Neighbour cell		1, 2	Cell2	
T2 final condition	Active cell		1, 2	Cell2	The UE reselects to high priority cell2 during T2
	Neighbour cell		1, 2	Cell1	
RF Channel Number			1, 2	1, 2	
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC configuration			1, 2	SMTC pattern 1	
DRX cycle length		s	1, 2	0.64	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2	Not configured	
T1		s	1, 2	85	T1 needs to be long enough to allow cell re-selection to already known cell.
T2		s	1, 2	85	T2 needs to be long enough to allow cell re-selection to already known cell.

Table A.7.1.1.6.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN for UE fulfilling not-at-cell edge criterion

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2

TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1, 2	SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET parameters		1, 2	CR.3.1 TDD		CR.3.1 TDD	
RMSI CORESET RMC configuration		1, 2	CCR.3.1 TDD		CCR.3.1 TDD	
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP configuration		1, 2	ULBWP.0.1		ULBWP.0.1	
RLM-RS		1, 2	SSB		SSB	
Qrxlevmin	dBm/SCS	1	-140		-140	
		2	-137		-137	
Pcompensation	dB	1, 2	0		0	
$Qhyst_s$	dB	1, 2	0		0	
$Qoffset_{s, n}$	dB	1, 2	0		0	
Cell_selection_and_ reselection_quality_ measurement		1, 2	SS-RSRP		SS-RSRP	
AoA setup		1, 2	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1	
Beam assumption Note 4		1, 2	Rough		Rough	
$\hat{E}_s/I_{ot}$	dB	1, 2	8	8	-3	8
N_{oc} Note2	dBm/SCS	1	-93		-93	
		2	-90		-90	
N_{oc} Note2	dBm/15 kHz	1, 2	-102		-102	
$\hat{E}_s/N_{oc}$	dB	1, 2	8	8	-3	8
SS-RSRP Note3	dBm/SCS	1	-85	-85	-96	-85
		2	-82	-82	-93	-82
Io	dBm/95.04 MHz	1	-55.37	-55.37	-62.25	-55.37
		2	-52.37	-52.37	-59.25	-52.37
$S_{SearchThresholdP}$		1, 2	35	35	35	35
TreselectionNR	s	1, 2	0		0	
SnonintrasearchP	dB	1, 2	50		Not sent	
$Thresh_{x, high}$	dB	1, 2	48		48	
$Thresh_{serving, low}$	dB	1, 2	44		44	
$Thresh_{x, low}$	dB	1, 2	50		50	
Propagation Condition		1, 2	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.1.1.6.3 Test Requirements

The cell reselection delay to an already detected low priority cell (Cell 1) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T1, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected low priority cell, Cell 1, shall be less than 79 s.

The cell reselection delay to an already detected high priority cell (Cell 2) for UE fulfilling not-at-cell edge criterion is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to an already detected high priority cell, Cell 2, shall be less than 79 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE 1: The cell re-selection delay to an already detected low priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$

NOTE 2: The cell re-selection delay to an already detected higher priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$

Where:

$T_{evaluate, NR\_ inter}$ See Table 4.2.2.10.3-1 in clause 4.2.2.10.3

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 78.8 s, allow 79 s for the cell re-selection delay to an already detected low priority cell for UE fulfilling not-at-cell edge criterion in the test case.

This gives a total of 78.08 s, allow 79 s for the cell re-selection delay to an already detected high priority cell for UE fulfilling not-at-cell edge criterion in the test case.

A.7.2 SA: RRC_INACTIVE state mobility

A.7.3 RRC_CONNECTED state mobility

A.7.3.1 Handover

A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤10	

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
Assumption for UE beams[Note 6]			N/A		Rough	
AoA setup			NA		Setup 1 as defined in A.3.15	
NR RF Channel Number			1		2	
Duplex mode	Config 1		FDD		TDD	
	Config 2,3		TDD		TDD	
TDD configuration	Config 1		Not Applicable		TDDConf.3.1	
	Config 2		TDDConf.1.1		TDDConf.3.1	
	Config 3		TDDConf.2.1		TDDConf.3.1	
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
	Config 2		10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
	Config 3		40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
	Config 2		10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
	Config 3		40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1		52		66	
	Config 2		52		66	
	Config 3		106		66	
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD		SR3.1 TDD	
	Config 2		SR.1.1 TDD		SR3.1 TDD	
	Config 3		SR2.1 TDD		SR3.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD		CR3.1 TDD	
	Config 2		CR.1.1 TDD		CR3.1 TDD	
	Config 3		CR2.1 TDD		CR3.1 TDD	
Control Channel RMC	Config 1		CCR.1.1 FDD		CCR.3.1 TDD	
	Config 2		CCR.1.1 TDD		CCR.3.1 TDD	
	Config 3		CCR.2.1 TDD		CCR.3.1 TDD	
OCNG Patterns			OP 1			
SSB configuration	Config 1,2		SSB.1 FR1		SSB. 3 FR2	
	Config 3		SSB.2 FR1		SSB. 3 FR2	
SMTC configuration	Config 1,2		SMTC.1		SMTC.1	
	Config 3		SMTC.2		SMTC.1	
SMTC configuration	Config 1,2		SMTC.1		SMTC.1	
	Config 3		SMTC.2		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz		120 kHz	
	Config 3		30 kHz		120 kHz	
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz		120 kHz	
	Config 3		30 kHz		120 kHz	
PRACH configuration			FR1 PRACH configuration 1		FR2 PRACH configuration 1	
TRS configuration	Config 1		TRS.1.1 FDD		TRS.2.1 TDD	
	Config 2		TRS.1.1 TDD		TRS.2.1 TDD	
	Config 3		TRS.1.2 TDD		TRS.2.1 TDD	
PDSCH/PDCCH TCI state			N/A		TCI.State.2	
BWP configuraiton	Initial DL BWP		DLBWP.0.1		DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1		DLBWP.1.1	
	Initial UL BWP		ULBWP.0.1		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1		ULBWP.1.1	

EPRE ratio of PSS to SSS		dB	0	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		dBm/15kHz	Link only, see clause A.3.7A	-104.7	
N_{oc} Note2	Config 1,2	dBm/SCS		-95.7	
	Config 3			-95.7	
$\hat{E}_s/I_{ot}$		dB		-Infinity	10
$\hat{E}_s/N_{oc}$		dB		-Infinity	10
Io Note3	Config 1,2	dBm/ BW		-66.7	-56.3
	Config 3	dBm/ BW		-66.7	-56.3
Propagation condition		-		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 572 ms from the beginning of time period T2.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = [10] ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 562 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.5.2.

This gives a total of 572 ms.

A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤10	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
Assumption for UE beams Note 6			Rough		Rough	
AoA setup			Setup 1 as defined in A.3.15			
NR RF Channel Number			**1**		**1**	
Duplex mode			TDD			
TDD configuration			TDDConf.3.1			
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66			
BWP BW		MHz	100: $N_{RB,c}$ = 66			
Data RBs allocated			66			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel			SR3.1 TDD			
RMSI CORESET Reference Channel			CR3.1 TDD			
Control Channel RMC			CCR.3.1 TDD			
OCNG Patterns			O P. 1			
SMTC Configuration			SMTC pattern 1			
SSB Configuration			SSB. 3 FR2			
PDSCH/PDCCH subcarrier spacing		kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
PDSCH/PDCCH TCI state			TCI.State.2			
BWP configuraiton	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-104.7			
N_{oc} Note2		dBm/SCS	-95.7			
$\hat{E}_s/I_{ot}$		dB	6	-1.8	-Infinity	0
$\hat{E}_s/N_{oc}$		dB	6	6	-Infinity	7
Io Note3		dBm/BW	-59.7	-56.7	-59.7	-56.7
Propagation condition		-	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 232 ms from the beginning of time period T2.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 222 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 232 ms.

A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dB	-120	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤10	

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
		T1	T2	T1	T2

Assumption for UE beams[Note 6]			Rough		Rough	
AoA setup			Setup 1as defined in A.3.15			
NR RF Channel Number			**1**		**2**	
Duplex mode			TDD			
TDD configuration			TDDConf.3.1			
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66			
BWP BW		MHz	100: $N_{RB,c}$ = 66			
Data RBs allocated			66			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel			SR3.1 TDD			
RMSI CORESET Reference Channel			CR3.1 TDD			
Control Channel RMC			CCR.3.1 TDD			
OCNG Patterns			O P. 1			
SMTC Configuration			SMTC pattern 1			
SSB Configuration			SSB. 3 FR2			
PDSCH/PDCCH subcarrier spacing		kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
PDSCH/PDCCH TCI state			TCI.State.2			
BWP configuraiton	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-104.7		-104.7	
N_{oc} Note2		dBm/SCS	-95.7		-95.7	
$\hat{E}_s/I_{ot}$		dB	5	5	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	5	5	-Infinity	5
Io[Note3]	Config 1,2	dBm/ BW	-60.5	-60.5	-66.7	-60.5
Propagation condition		-	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 552 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 542 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 552 ms.

A.7.3.1.4 Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2

A.7.3.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR2 Inter-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.4.

A.7.3.1.4.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.4.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.4.2-2, A.7.3.1.4.2-3 and A.7.3.1.4.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

Table A.7.3.1.4.2-1: Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.7.3.1.4.2-2: General test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells		μs	33	Synchronous cells
T1		s	5	
T2		s	<5	
T3		s	<0.5	
T4		ms	$10+T_{interrupt2}$	$T_{interrupt2}$ as defined in Table 6.1.3.4.2-2 for synchronous DAPS HO
T5		ms	100	

Table A.7.3.1.4.2-3: Cell specific test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 (Cell 1 in FR1)

Parameter		Unit	Cell 1				
			T1	T2	T3	T4	T5
NR RF Channel Number			1				
Duplex mode	Config 1		FDD				
	Config 2,3		TDD				
TDD configuration	Config 1		Not Applicable				
	Config 2		TDDConf.1.1				
	Config 3		TDDConf.2.1				
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52				
	Config 2		10: $N_{RB,c}$ = 52				
	Config 3		40: $N_{RB,c}$ = 106				
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52				
	Config 2		10: $N_{RB,c}$ = 52				
	Config 3		40: $N_{RB,c}$ = 106				
TRS configuration	Config 1		TRS.1.1 FDD				
	Config 2		TRS.1.1 TDD				
	Config 3		TRS.1.2 TDD				
DRx Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD				
	Config 2		SR.1.1 TDD				
	Config 3		SR2.1 TDD				
CORESET Reference Channel	Config 1		CR.1.1 FDD				
	Config 2		CR.1.1 TDD				
	Config 3		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
SSB Configuration	Config 1,2		SSB.1 FR1				
	Config 3		SSB.2 FR1				
SMTC Configuration	Config 1,2		SMTC.1				
	Config 3		SMTC.2				
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz				
	Config 3		30 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz				
	Config 3		30 kHz				
PRACH configuration			FR1 PRACH configuration 2				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	NA Link only, see clause A.3.7A				
N_{oc} Note2	Config 1,2	dBm/SCS					
	Config 3						

$\hat{E}_s/I_{ot}$		dB	
$\hat{E}_s/N_{oc}$		dB	
Io[Note3]	Config 1,2	dBm/ 9.36MHz	
	Config 3	dBm/ 38.16MHz	
Propagation condition		-	AWGN
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.7.3.1.4.2-4: Cell specific test parameters for Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 (Cell 2 in FR2)

Parameter		Unit	Cell 2				
			T1	T2	T3	T4	T5
Assumption for UE beams[Note 6]			Rough				
AoA setup			Setup 1 as defined in A.3.15				
NR RF Channel Number			2				
Duplex mode	Config 1,2,3		TDD				
TDD configuration	Config 1,2,3		TDDConf.3.1				
$BW_{channel}$	Config 1,2,3	MHz	100: $N_{RB,c}$ = 66				
BWP BW	Config 1,2,3	MHz	100: $N_{RB,c}$ = 66				
TRS configuration	Config 1,2,3		TRS.2.1 TDD				
DRX Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1,2,3		SR3.1 TDD				
CORESET Reference Channel	Config 1,2,3		CR3.1 TDD				
OCNG Patterns			OCNG pattern 1				
SSB Configuration	Config 1,2,3		SSB.1 FR2				
SMTC Configuration			SMTC.1				
PDSCH/PDCCH subcarrier spacing	Config 1,2,3	kHz	120 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2,3	kHz	120 kHz				
PRACH configuration			FR2 PRACH configuration 2				
TCI configuration			CSI-RS.Config.0				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	-104.7	-104.7	-104.7	-104.7	-104.7
N_{oc} Note2		dBm/SCS	-95.7	-95.7	-95.7	-95.7	-95.7
$\hat{E}_s/I_{ot}$		dB	-Infinity	10	10	10	10
$\hat{E}_s/N_{oc}$		dB	-Infinity	10	10	10	10
Io[Note3]		dBm/ 9.36MHz	-66.7	-55.4	-55.4	-55.4	-55.4
Propagation condition		-	AWGN				
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.							

Note 3:	Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone.
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.7.3.1.4.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T3. During $D_{handover1}$, the interruption on Cell 1 shall not exceed $T_{interrupt1}$ as defined in Table 6.1.3.4.2-1 for synchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $T_{RRC\_procedure} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

T_{IU} = 20 ms in the test. T_{IU} is defined in clause 6.1.1.2.2.

T_{Δ} = 20 ms in the test. T_{Δ} is defined in clause 6.1.1.2.2.

$T_{processing}$ = 40 ms in the test. $T_{processing}$ is defined in clause 6.1.1.2.2.

T_{margin} = 2 ms in the test. T_{margin} is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

The UE shall complete to release Cell 1 less than (10 ms + $T_{interrupt2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed $T_{interrupt2}$ as defined in Table 6.1.3.4.2-2 for synchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC\_procedure} + T_{interrupt2}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

A.7.3.1.5 Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2

A.7.3.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the FR1-to-FR2 Inter-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.4.

A.7.3.1.5.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.5.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.5.2-2, A.7.3.1.5.2-3 and A.7.3.1.5.2-4.

The test scenario comprises of two bands each with one cell. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be able to perform random access to Cell 2. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perform DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

Table A.7.3.1.5.2-1: Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.7.3.1.5.2-2: General test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells		μs	62.5	Asynchronous cells
T1		s	5	
T2		s	<5	
T3		s	<0.5	
T4		ms	$10+T_{interrupt2}$	$T_{interrupt2}$ as defined in Table 6.1.3.4.2-2 for asynchronous DAPS HO.
T5		ms	100	

Table A.7.3.1.5.2-3: Cell specific test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 (Cell 1 in FR1)

Parameter		Unit	Cell 1				
			T1	T2	T3	T4	T5
NR RF Channel Number			1				
Duplex mode	Config 1		FDD				
	Config 2,3		TDD				
TDD configuration	Config 1		Not Applicable				
	Config 2		TDDConf.1.1				
	Config 3		TDDConf.2.1				
$BW_{channel}$	Config 1	MHz	10: $N_{RB,c}$ = 52				
	Config 2		10: $N_{RB,c}$ = 52				
	Config 3		40: $N_{RB,c}$ = 106				
BWP BW	Config 1	MHz	10: $N_{RB,c}$ = 52				
	Config 2		10: $N_{RB,c}$ = 52				
	Config 3		40: $N_{RB,c}$ = 106				
TRS configuration	Config 1		TRS.1.1 FDD				
	Config 2		TRS.1.1 TDD				
	Config 3		TRS.1.2 TDD				
DRx Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD				
	Config 2		SR.1.1 TDD				
	Config 3		SR2.1 TDD				
CORESET Reference Channel	Config 1		CR.1.1 FDD				
	Config 2		CR.1.1 TDD				
	Config 3		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
SSB Configuration	Config 1,2		SSB.1 FR1				
	Config 3		SSB.2 FR1				
SMTC Configuration	Config 1,2		SMTC.1				
	Config 3		SMTC.2				
PDSCH/PDCCH subcarrier spacing	Config 1,2	kHz	15 kHz				
	Config 3		30 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2	kHz	15 kHz				
	Config 3		30 kHz				
PRACH configuration			FR1 PRACH configuration 2				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	NA Link only, see clause A.3.7A				

N_{oc} Note2	Config 1,2	dBm/SCS	
	Config 3		
$\hat{E}_s/I_{ot}$		dB	
$\hat{E}_s/N_{oc}$		dB	
Io Note3	Config 1,2	dBm/ 9.36MHz	
	Config 3	dBm/ 38.16MHz	
Propagation condition		-	AWGN
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.7.3.1.5.2-4: Cell specific test parameters for Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 (Cell 2 in FR2)

Parameter		Unit	Cell 2				
			T1	T2	T3	T4	T5
Assumption for UE beams Note 6			Rough				
AoA setup			Setup 1 as defined in A.3.15				
NR RF Channel Number			2				
Duplex mode	Config 1,2,3		TDD				
TDD configuration	Config 1,2,3		TDDConf.3.1				
$BW_{channel}$	Config 1,2,3	MHz	100: $N_{RB,c}$ = 66				
BWP BW	Config 1,2,3	MHz	100: $N_{RB,c}$ = 66				
TRS configuration	Config 1,2,3		TRS.2.1 TDD				
DRX Cycle		ms	Not Applicable				
PDSCH Reference measurement channel	Config 1,2,3		SR3.1 TDD				
CORESET Reference Channel	Config 1,2,3		CR3.1 TDD				
OCNG Patterns			OCNG pattern 1				
SSB Configuration	Config 1,2,3		SSB.1 FR2				
SMTC Configuration			SMTC.1				
PDSCH/PDCCH subcarrier spacing	Config 1,2,3	kHz	120 kHz				
PUCCH/PUSCH subcarrier spacing	Config 1,2,3	kHz	120 kHz				
PRACH configuration			FR2 PRACH configuration 2				
TCI configuration			CSI-RS.Config.0				
BWP	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.3				
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.3				
EPRE ratio of PSS to SSS		dB	0				
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	-104.7	-104.7	-104.7	-104.7	-104.7
N_{oc} Note2		dBm/SCS	-95.7	-95.7	-95.7	-95.7	-95.7
$\hat{E}_s/I_{ot}$		dB	-Infinity	10	10	10	10
$\hat{E}_s/N_{oc}$		dB	-Infinity	10	10	10	10
Io Note3		dBm/ 9.36MHz	-66.7	-55.4	-55.4	-55.4	-55.4
Propagation condition		-	AWGN				

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone.
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.7.3.1.5.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T3. During $D_{handover1}$, the interruption on Cell 1 shall not exceed $T_{interrupt1}$ as defined in Table 6.1.3.4.2-1 for asynchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $T_{RRC\_procedure} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

T_{IU} = 20 ms in the test. T_{IU} is defined in clause 6.1.1.2.2.

T_{Δ} = 20 ms in the test. T_{Δ} is defined in clause 6.1.1.2.2.

$T_{processing}$ = 40 ms in the test. $T_{processing}$ is defined in clause 6.1.1.2.2.

T_{margin} = 2 ms in the test. T_{margin} is defined in clause 6.1.1.2.2.

This gives a total of 792 ms.

The UE shall complete to release Cell 1 less than (10 ms + $T_{interrupt2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed $T_{interrupt2}$ as defined in Table 6.1.3.4.2-2 for asynchronous DAPS HO.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC\_procedure} + T_{interrupt2}$, where:

$T_{RRC\_procedure}$ = 10 ms and is specified in clause 12 in TS 38.331 [2].

A.7.3.2 RRC Connection Mobility Control

A.7.3.2.1 SA: RRC Re-establishment

A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1	Cell1	
	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channel Number			1	1	
Time offset between cells			1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR2	
SMTC configuration			1	SMTC pattern 1	
DRX cycle length		s	1	OFF	
PRACH configuration			1	FR2 PRACH configuration 1	Table A.3.8.3.1-1
T1		s	1	5	
T2		ms	1	1600	Time for the UE to detect RLF
T3		s	1	3	

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
Assumption for UE beams Note 4			Rough			Rough		
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC configuration		1	SR.3.1 TDD			N/A		
RMSI CORESET RMC configuration		1	CR.3.1 TDD			CR.3.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD			CCR.3.1 TDD		
TRS configuration		1	TRS.2.1 TDD			N/A		
PDSCH/PDCCH TCI state		1	TCI.State.2			N/A		
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1	SSB			SSB		
AoA setup		1	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1		
$\hat{E}_s/I_{ot}$	dB	1	-0.12	-infinity	-infinity	-3.46	2	2
N_{oc} Note2	dBm/15 kHz	1	-104.7					
N_{oc} Note2	dBm/SCS	1	-95.7					
$\hat{E}_s/N_{oc}$	dB	1	4	-infinity	-infinity	2	2	2
SS-RSRP Note3	dBm/SCS	1	-91.7	-infinity	-infinity	-93.7	-93.7	-93.7
Io	dBm/95.04 MHz	1	-59.64	-62.59	-62.59	-59.94	-62.59	-62.59
Propagation Condition		1	AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation								

A.7.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish\_delay} = T_{UL\_grant} + T_{UE\_re\text{-}establish\_delay}.$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

$N_{freq} = 1$

$T_{identify\_intra\_NR}$ = 1600 ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.2.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1	Cell1	
	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channel Number			1	1, 2	
Time offset between cells			1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR2	
			1	SMTC pattern 1	
DRX cycle length		s	1	OFF	
PRACH configuration			1	FR2 PRACH configuration 1	Table A.3.8.3.1-1
T1		s	1	5	
T2		ms	1	1600	Time for the UE to detect RLF
T3		s	1	6	

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
Assumption for UE beams Note 4			Rough			Rough		
AoA setup		1	Setup 3 as specified in clause A.3.15					
			AoA1			AoA2		
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66			100: $N_{RB,c}$ = 66		
Data RBs allocated		1	24			24		
PDSCH RMC configuration		1	SR.3.1 TDD			N/A		
RMSI CORESET RMC configuration		1	CR.3.1 TDD			CR.3.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD			CCR.3.1 TDD		
TRS configuration		1	TRS.2.1 TDD			N/A		
PDSCH/PDCCH TCI state		1	TCI.State.2			N/A		
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1	SSB			SSB		
N_{oc} Note2	dBm/15 kHz	1	-92.1			-92.1		
N_{oc} Note2	dBm/SCS	1	-83.1			-83.1		
$\hat{E}_s/N_{oc}$	dB	1	0	-infinity	-infinity	-infinity	-infinity	0
$\hat{E}_s/I_{ot_{BB}}$ Note 5	dB	1	-1.01	-infinity	-infinity	-infinity	-infinity	-1.01
SSB_RP Note3	dBm/SCS	1	-83.1	-infinity	-infinity	-infinity	-infinity	-83.1
Io	dBm/95.04 MHz	1	-55.46	-infinity	-infinity	-infinity	-infinity	-55.46
Propagation Condition		1	AWGN			AWGN		

Note 1: OCNG shall be used such that a constant total transmitted power is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish\_delay} = T_{UL\_grant} + T_{UE\_re\text{-}establish\_delay}.$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

$N_{freq} = 2$

$T_{identify\_intra\_NR}$ = 1600 ms

$T_{identify\_inter\_NR}$ = 2080 ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1	Cell1	
	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channel Number			1	1	
Time offset between cells			1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	6000	Radio link failure timer configured by *RLF-TimersAndConstants*
T311		ms	1	5000	RRC re-establishment timer
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR2	
SMTC configuration			1	SMTC pattern 1	
DRX cycle length		s	1	OFF	
PRACH configuration			1	FR2 PRACH configuration 1	Table A.3.8.3.1-1
T1		s	1	5	
T2		s	1	6	Time for the UE to detect RLF
T3		s	1	5	

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
Assumption for UE beams Note 4			Rough			Rough		
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
		1	SR.3.1 TDD			N/A		
RMSI CORESET RMC configuration		1	CR.3.1 FDD			CR.3.1 FDD		
Dedicated CORESET RMC configuration		1	CCR.3.1 FDD			CCR.3.1 FDD		
TRS configuration		1	TRS.2.1 TDD			N/A		
PDSCH/PDCCH TCI state		1	TCI.State.2			N/A		
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1	SSB			SSB		
AoA setup		1	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1		
$\hat{E}_s/I_{ot}$	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
N_{oc} Note2	dBm/15 kHz	1	-104.7					
N_{oc} Note2	dBm/SCS	1	-95.7					
$\hat{E}_s/N_{oc}$	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
SS-RSRP Note3	dBm/SCS	1	-90.7	-infinity	-infinity	-infinity	-infinity	-90.7
Io	dBm/95.04 MHz	1	-60.52	-66.71	-60.52	-60.52	-66.71	-60.52
Propagation Condition		1	AWGN					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish\_delay} = T_{UL\_grant} + T_{UE\_re\text{-}establish\_delay}.$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

$N_{freq} = 1$

$T_{identify\_intra\_NR}$ = 3520 ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.2 Random Access

A.7.3.2.2.1 4-step RA type c ontention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	
Duplex Mode for Cell 1	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	As defined in A.3.1.4
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1		24	
OCNG Pattern Note 1			OCNG pattern 1	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR.3.1 TDD	As defined in A.3.1.1.
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD	As defined in A.3.1.2
NR RF Channel Number			1	
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH_DMRS to SSS		dB		
EPRE ratio of PBCH to PBCH_DMRS		dB		
EPRE ratio of PDCCH_DMRS to SSS		dB		
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_DMRS to SSS		dB		
EPRE ratio of PDSCH to PDSCH_DMRS		dB		
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δ_{UL}	As defined in TS 38.331 [2]. Δ_{UL} is derived from the uplink calibration process Note 3
Configured UE transmitted power ($P_{CMAX,f,c}$)		dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3, with exceptions as defined below
rsrp-ThresholdSSB		dBm	RSRP_69 +Δ_{DL}	RSRP_69 corresponds to -88dBm. Δ_{DL} is derived from the downlink calibration process Note 4
preambleReceivedTargetPower		dBm	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: The Δ_{UL} value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.

Note 4: The Δ_{DL} value is calculated as ($RSRP\_{REP}$ – RSRP_76), where $RSRP\_{REP}$ is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
AoA setup			Setup 1	As defined in A.3.15.1
Assumption for UE beams Note 3			Rough	
SSB with index 0	Es Note1	dBm/SCS	-80.6	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	SSB_RP	dBm/SCS	-80.6	
	Es/Iot_{BB}	dB	21.09	
	Io	dBm/95.04 MHz	-56.01	Io in symbols containing SSB index 0
SSB with index 1	Es Note1	dBm/SCS	-95.0	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	SSB_RP	dBm/SCS	-95.0	
	Es/Iot_{BB}	dB	6.69	
	Io	dBm/95.04 MHz	-70.41	Io in symbols containing SSB index 1
Propagation Condition		-	AWGN	
Note 1: No articial noise is applied in this test. Note 2: Void. Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.7.3.2.2.2 4-step RA type n on-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB.1 FR2	SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	TRS.2.1 TDD	

CSI-RS Configuration	Config 1		N/A	CSI-RS.3.1 TDD	As defined in A.3.1.4
Duplex Mode for Cell 2	Config 1		TDD	TDD	
TDD Configuration	Config 1		TDDConf.3.1	TDDConf.3.1	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1		24	24	
OCNG Pattern Note 1			OP.3	OP.3	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1.
NR RF Channel Number			1	1	
EPRE ratio of PSS to SSS		dB	0	0	
EPRE ratio of PBCH_DMRS to SSS		dB			
EPRE ratio of PBCH to PBCH_DMRS		dB			
EPRE ratio of PDCCH_DMRS to SSS		dB			
EPRE ratio of PDCCH to PDCCH_DMRS		dB			
EPRE ratio of PDSCH_DMRS to SSS		dB			
EPRE ratio of PDSCH to PDSCH_DMRS		dB			
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δ_{UL}	+20 +Δ_{UL}	As defined in TS 38.331 [2]. Δ_{UL} is derived from the uplink calibration process Note 3
Configured UE transmitted power ($P_{CMAX,f,c}$)		dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3, with exceptions as defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +Δ_{DL}	RSRP_69 +Δ_{DL}	RSRP_69 corresponds to -88dBm. Δ_{DL} is derived from the downlink calibration process Note 4
preambleReceivedTargetPower		dBm	-100	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: The Δ_{UL} value is calculated as -ROUND(P_{PRACH0} -1), where P_{PRACH0} is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.

Note 4: The Δ_{DL} value is calculated as ($RSRP\_{REP}$ – RSRP_76), where $RSRP\_{REP}$ is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
AoA setup			Setup 1	Setup 1	As defined in A.3.15.1
Assumption for UE beams Note 3			Rough	Rough	
SSB with index 0	Es Note1	dBm/SCS	-80.6	-80.6	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	SSB_RP	dBm/SCS	-80.6	-80.6	
	Es/Iot$_{BB}$	dB	21.09	21.09	
	Io	dBm/95.04 MHz	-56.01	-56.01	Io in symbols containing SSB index 0
SSB with index 1	Es Note1	dBm/SCS	-95.0	-95.0	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	SSB_RP	dBm/SCS	-95.0	-95.0	
	Es/Iot$_{BB}$	dB	6.69	6.69	
	Io	dBm/95.04 MHz	-70.41	-70.41	Io in symbols containing SSB index 1
Propagation Condition		-	AWGN	AWGN	
Note 1: No articial noise is applied in this test. Note 2: void. Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble tranmsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occassions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.3 2-step RA type contention based random access test in FR2 for NR Standalone

A.7.3.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.3.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.3.1-2 and Table A.7.3.2.2.3.1-3.

Table A.7.3.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.3.1-2: General test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1		SSB.1 FR2	As defined in A.3.10
Duplex Mode for Cell 1	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	As defined in A.3.1.4
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 24	
OCNG Pattern Note 1			OCNG pattern 1	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR.3.1 TDD	As defined in A.3.1.1.
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD	As defined in A.3.1.2
NR RF Channel Number			1	
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH_DMRS to SSS		dB		
EPRE ratio of PBCH to PBCH_DMRS		dB		
EPRE ratio of PDCCH_DMRS to SSS		dB		
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_DMRS to SSS		dB		
EPRE ratio of PDSCH to PDSCH_DMRS		dB		
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δ_{UL}	As defined in TS 38.331 [2]. Δ_{UL} is derived from the uplink calibration process Note 3
Configured UE transmitted power ($P_{CMAX, f, c}$)		dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
MsgA Configuration			FR2 MsgA configuration 1	As defined in A.3.20.3, with exceptions as defined below
msgA-RSRP-ThresholdSSB		dBm	RSRP_69 +Δ_{DL}	RSRP_69 corresponds to -88dBm. Δ_{DL} is derived from the downlink calibration process Note 4
preambleReceivedTargetPower		dBm	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 3: The Δ_{UL} value is calculated as -ROUND(PMsgA0 -1), where PMsgA0 is the measured first MsgA PRACH power with -80.6dBm/SCS applied, *msgA-PreambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send MsgA.
Note 4: The Δ_{DL} value is calculated as ($RSRP\_{REP}$ – RSRP_76), where $RSRP\_{REP}$ is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.3.1-3: OTA-related test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
AoA setup			Setup 2b	As defined in A.3.15.1
Assumption for UE beams[Note 2]			Rough	
SSB with index 0	Es [Note1]	dBm/SCS	-80.6	Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*
	SSB_RP	dBm/SCS	-80.6	
	Es/Iot_{BB}	dB	21.09	
	Io	dBm/95.04 MHz	-56.01	Io in symbols containing SSB index 0
SSB with index 1	Es [Note1]	dBm/SCS	-95.0	Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*
	SSB_RP	dBm/SCS	-95.0	
	Es/Iot_{BB}	dB	6.69	
	Io	dBm/95.04 MHz	-70.41	Io in symbols containing SSB index 1
Propagation Condition		-	AWGN	
Note 1: No articial noise is applied in this test. Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.3.2.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.7.3.2.2.3.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.3.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a fallbackRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit MsgA with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB's contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA PRACH shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a fallbackRAR message and Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA PRACH shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.4 2-step RA type n on-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.4.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.4.1-2 and Table A.7.3.2.2.4.1-3.

Table A.7.3.2.2.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1		SSB.1 FR2	As defined in A.3.10
Duplex Mode for Cell 2	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR3.1 TDD	As defined in A.3.1.1.
NR RF Channel Number			1	
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH_DMRS to SSS		dB		
EPRE ratio of PBCH to PBCH_DMRS		dB		
EPRE ratio of PDCCH_DMRS to SSS		dB		
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_DMRS to SSS		dB		
EPRE ratio of PDSCH to PDSCH_DMRS		dB		
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δ_{UL}	As defined in TS 38.331 [2]. Δ_{UL} is derived from the uplink calibration process Note 3
Configured UE transmitted power ($P_{CMAX,f,c}$)		dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
MsgA Configuration			FR2 MsgA configuration 2	As defined in A.3.20.3, with exceptions as defined below.
msgA-RSRP-ThresholdSSB		dBm	RSRP_69 +Δ_{DL}	RSRP_69 corresponds to -88dBm. Δ_{DL} is derived from the downlink calibration process Note 4
msgA-PreambleReceivedTargetPower		dBm	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 3: The Δ_{UL} value is calculated as -ROUND(P_{MsgA0} -1), where P_{MsgA0} is the measured first MsgA PRACH power with -80.6dBm/SCS applied, *msgA-PreambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send MsgA.
Note 4: The Δ_{DL} value is calculated as (RSRP$_{_REP}$ – RSRP_76), where RSRP$_{_REP}$ is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.4.1-3: OTA-related test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
AoA setup			Setup 1	As defined in A.3.15.1
Assumption for UE beams Note 2			Rough	
SSB with index 0	Es Note1	dBm/SCS	-80.6	Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*
	SSB_RP	dBm/SCS	-80.6	
	Es/Iot_{BB}	dB	21.09	
	Io	dBm/95.04 MHz	-56.01	Io in symbols containing SSB index 0
SSB with index 1	Es Note1	dBm/SCS	-95.0	Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*
	SSB_RP	dBm/SCS	-95.0	
	Es/Iot_{BB}	dB	6.69	
	Io	dBm/95.04 MHz	-70.41	Io in symbols containing SSB index 1
Propagation Condition		-	AWGN	
Note 1: No artificial noise is applied in this test. Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.3.2.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.4.2.1 MsgA Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.3.2.1 for MsgA transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble after 3 MsgA transmissions have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB if the MsgB contains a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power if all received Random Access Response Reception has not been considered as successful.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window configured in *RACH-ConfigGenericTwoStepRA*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.3 SA: RRC Connection Release with Redirection

A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	3.2	

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
Assumption for UE beams Note 6			Rough		Rough	
AoA setup			Setup 1as defined in A.3.15			
NR RF Channel Number			1		2	
Duplex mode			TDD			
TDD configuration			TDDConf.3.1			
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66			
BWP BW		MHz	100: $N_{RB,c}$ = 66			
Data RBs allocated			66			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel			SR3.1 TDD			
RMSI CORESET Reference Channel			CR3.1 TDD			
Control Channel RMC			CCR.3.1 TDD			
OCNG Patterns			O P. 1			
SMTC configuration			SMTC.1 FR2			
SSB Configuration			SSB.3 FR2			
PDSCH/PDCCH subcarrier spacing		kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
PDSCH/PDCCH TCI state			TCI.State.2			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-104.7		-104.7	
N_{oc} Note2		dBm/SCS	-95.7		-95.7	
$\hat{E}_s/I_{ot}$		dB	5	5	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	5	5	-Infinity	5
Io Note3		dBm/BW	-60.5	-60.5	-66.7	-60.5
Propagation condition		-	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test

system implementation

A.7.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection\_release\_redirect\_NR} = T_{RRC\_procedure\_delay} + T_{identify\text{-}NR} + T_{SI\text{-}NR} + T_{RACH},$$

where:

$T_{RRC\_procedure\_delay}$ = 110 ms in the test.

$T_{identify\text{-}NR}$ = 1760 ms in the test.

$T_{SI\text{-}NR}$ = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

T_{RACH} = 10 ms in the test.

This gives a total of 3160 ms.

A.7.3.3 Conditional Handover

A.7.3.3.1 Intra-frequency conditional handover from FR2 to FR2

A.7.3.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency conditional handover requirements specified in clause 6.1.4.4.

A.7.3.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.3.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.3.2.2-2, and A.7.3.3.2.2-3.

The test scenario comprises of two cells. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying handover to cell 2 during T1, at a time earlier than T_{RRC} before the beginning of T2. Starting T2, cell 2 becomes detectable.

Table A.7.3.3.1.2-1: Intra-frequency conditional handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.3.1.2-2: General test parameters for conditional Intra-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset for condition		dBm	-1	Trigger HO to cell which may be measured as -1dB relative to cell 1. Actual SS-RSRP is 5dB stronger.
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤2	

Table A.7.3.3.1.2-3: Cell specific test parameters for NR FR2-FR2 conditional Intra frequency handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		1	
AoA setup			Setup 1 as defined in A.3.15			
Assumption for UE beams Note 6			Rough			
Duplex mode			TDD			
TDD configuration			TDDConf.3.1			
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66			
BWP BW		MHz	100: $N_{RB,c}$ = 66			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel			SR3.1 TDD			
CORESET Reference Channel			CR3.1 TDD			
OCNG Patterns			OCNG pattern 1			
SMTC Configuration			SMTC pattern 1			
SSB Configuration			SSB.1 FR2			
PDSCH/PDCCH subcarrier spacing		kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
TCI configuration			CSI-RS.Config.0			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-104.7		-104.7	
N_{oc} Note2	Config 1	dBm/SCS	-98.7		-98.7	
$\hat{E}_s/I_{ot}$		dB	6	-5.33	-Infinity	4.02
$\hat{E}_s/N_{oc}$		dB	6	6	-Infinity	11
Io Note3	Config 1	dBm/BW	-62.7	-57.2	-62.7	-57.2
Propagation condition		-	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.3.1.2.3 Test Requirements

T_{RRC} + T_{Event_DU} occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure}$ + $T_{interrupt}$ + $T_{CHO\_execution}$ =1600+62+10=1672 ms (power class 1) or 1080+62+10 =1152 (PC2/3/4) 62 ms=1152 ms (power classes 2,3 and 4) from the start of T2 and the interruption during T2 shall not exceeed $T_{interrupt}$=$T_{processing}$ + T_{IU} + T_{Δ} + T_{margin} =40+20+2 = 62ms excluding any transmissions which do not occur due to scheduling restrictions.

A.7.3.3.2 Inter-frequency handover from FR2 to FR2; unknown target cell

A.7.3.3.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency conditional handover requirements specified in clause 6.1.4.4.

A.7.3.3.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.3.3.2-1. Both conditional handover delay and interruption length are tested by using the parameters in table A.7.3.3.3.2-2, and A.7.3.3.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. Gap pattern ID gp0 is configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. . At the start of time duration T1, the UE does not have any timing information of cell 2. NR shall configure a condition implying handover to cell 2 during T1, at a time earlier than T_{RRC} before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

Table A.7.3.3.2.2-1: Inter-frequency conditional handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.3.2.2-2: General test parameters Inter-frequency conditional handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset for handover condition		dB	-120	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	$\leq$7	

Table A.7.3.3.2.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency conditional handover test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		2	
AoA setup			Setup 1 as defined in A.3.15			
Assumption for UE beams[Note 6]			Rough			
Duplex mode			TDD			
TDD configuration			TDDConf.3.1			
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66			
BWP BW		MHz	100: $N_{RB,c}$ = 66			
DRx Cycle		ms	Not Applicable			
Gap pattern ID			gp0			
PDSCH Reference measurement channel			SR3.1 TDD			
CORESET Reference Channel			CR3.1 TDD			
OCNG Patterns			OCNG pattern 1			
SMTC Configuration			SMTC pattern 1			
SSB Configuration			SSB.1 FR2			
PDSCH/PDCCH subcarrier spacing		kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
TCI configuration			CSI-RS.Config.0			
BWP configuraiton	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-104.7		-104.7	
N_{oc} Note2	Config 1,2	dBm/SCS	-95.7		-95.7	
	Config 3		-95.7		-95.7	
$\hat{E}_s/I_{ot}$		dB	5	5	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	5	5	-Infinity	5
Io[Note3]	Config 1,2	dBm/BW	-60.5	-60.5	-66.7	-60.5
	Config 3	dBm/BW	-60.5	-60.5	-66.7	-60.5
Propagation condition		-	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.3.2.3 Test Requirements

T_{RRC} + T_{Event_DU} occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO\_execution}$ = 6720+62+10ms=6792 ms (power class 1) or 4160+62+10ms =4232ms (power classes 2,3 and 4) from the start of T2 and the interruption during T2 shall not exceeed $T_{interrupt}=T_{processing} + T_{IU} + T_{\Delta} + T_{margin}$ =40+20+2 = 62ms excluding any transmissions which do not occur due to scheduling restrictions. excluding any transmissions which do not occur due to scheduling restrictions.

A.7.4 Timing

A.7.4.1 UE transmit timing

A.7.4.1.1 NR UE Transmit Timing Test for FR2

A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz

For this test a single NR cell is used. Tables A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1	Freq1	Freq1
TDD configuration		1	TDDConf.3.1	
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66	
Data RBs allocated		1	66	
Initial BWP Configuration		1	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1	DLBWP.1.1 ULBWP.1.1	
TRS Configuration		1	TRS.2.1 TDD	
PDSCH/PDCCH TCI state		1	TCI.State.2	
DRx Cycle	ms	1	N/A	DRX.8 Note5
PDSCH Reference measurement channel		1	SR.3. 3 TDD	
RMSI CORESET Reference Channel		1	CR.3. 2 TDD	
Dedicated CORESET Reference Channel		1	CCR.3. 7 TDD	
OCNG Patterns		1	OP.1	
SSB Configuration		1	SSB.4 FR2	
SMTC Configuration		1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1	120	
EPRE ratio of PSS to SSS	dB	1	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation condition		1	AWGN	
SRS Config		1	SRSConf.1 Note6	SRSConf.2 Note6
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void Note 5: DRx related parameters are given in Table A.3.3.8-1 Note 6: SRS configs are given in Table A.7.4.1.1.1-3				

Table A.7.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1	
Assumption for UE beams Note 6		Fine	
N_{oc} Note1	dBm/15kHz Note4	-112	
N_{oc} Note1	dBm/SCS Note3	-100	
$\hat{E}_s/N_{oc}$	dB	4	
SS-RSRP Note2	dBm/SCS Note4	-96	
$\hat{E}_s/I_{ot}$	dB	4	
Io Note2	dBm/95.04 MHz Note4	-68.5	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS B_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Void
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table A.7.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-ResourceId	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	17	17	Matches $N_{RB,c}$
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl2560, 4	Offset to align with DRx periodicity
	sequenceId	0	0	Any 10 bit number

Table A.7.4.1.1.1-4: Void

A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.

   a. The N_{TA} offset value (in T_c units) is 13792

   b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value	
	Test1	Test2
240	$+8*64T_c$	$+4*64T_c$

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (N_{TA} + N_{TA_offset}) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX confiured.

5) The test system shall verify that the UE transmit timing offset stays within (N_{TA} + N_{TA_offset}) ×T_c ± T_e of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.7.4.2 UE timer accuracy

A.7.4.3 Timing advance

A.7.4.3.1 SA FR2 timing advance adjustment accuracy

A.7.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.7.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.1.2-2, A.7.4.3.1.2-3 and A.7.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.7.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T_A) value during T1		31	$N_{TA\_new} = N_{TA\_old}$ for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T_A) value during T2		39	*For 120 kHz SCS* $N_{TA\_new} = N_{TA\_old} + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	s	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1	
		T1	T2
Duplex mode		TDD	
TDD configuration		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66	
BWP BW	MHz	100: $N_{RB,c}$ = 66	
DRx Cycle	ms	Not Applicable	
PDSCH Reference measurement channel		SR.3.1 TDD	
CORESET Reference Channel		CR.3.1 TDD	
OCNG Patterns		OCNG pattern 1	
TRS configuration		TRS.2.1 TDD	
PDSCH/PDCCH TCI state		TCI.State.2	
SMTC configuration		SMTC.1 FR2	
SSB Configuration		SSB.3 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120 kHz	
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz	
EPRE ratio of PSS to SSS	dB	0	
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Propagation condition	-	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone			

Table A.7.4.3.1.2-3A: OTA related test parameters

Parameter	Unit	Test 1	
		T1	T2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1	
Assumption for UE beams Note 6		Fine	
N_{oc} Note1	dBm/15kHz Note4	-112	
N_{oc} Note1	dBm/SCS Note3	-103	
$\hat{E}_s/N_{oc}$	dB	4	
SS-RSRP Note2	dBm/SCS Note4	-99	
$\hat{E}_s/I_{ot}$	dB	4	
Io Note2	dBm/95.04 MHz Note4	-68.5	

Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment
c-SRS	16	Frequency hopping is disabled
b-SRS	0	
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting. SRS on last symbol of slot, and 1symbols for SRS without repetition.
nrofSymbols	n1	
repetitionFactor	n1	
combOffset-n2	0	transmissionComb setting
cyclicShift-n2	0	
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

A.7.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. $k+1$ slots after the reception of the timing advance command, where $k = 11$.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.7.5 Signaling characteristics

A.7.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

Parameter			Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel Number				1
Duplex mode		Config 1		TDD
$BW_{channel}$		Config 1		100: $N_{RB,c}$ = 66
Data RBs allocated		Config 1		24
DL initial BWP configuration		Config 1		DLBWP.0.1
DL dedicated BWP configuration		Config 1		DLBWP.1.1
UL initial BWP configuration		Config 1		ULBWP.0.1
UL dedicated BWP configuration		Config 1		ULBWP.1.1
TDD Configuration		Config 1		TDDConf.3.1
RMSI CORESET Reference Channel		Config 1		CR.3.1 TDD
SSB Configuration		Config 1		SSB.1 FR2
SMTC Configuration		Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing		Config 1		120 KHz
PRACH Configuration		Config 1		Table A.3.8.3.4
SSB index assigned as RLM RS		Config 1		0,1
OCNG parameters				OP. 5
CP length				Normal
Out of sync transmission parameters	DCI format			1-0
	Number of Control OFDM symbols			2
	Aggregation level		CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy		dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		dB	4
	DMRS precoder granularity			REG bundle size
	REG bundle size			6
DRX				*OFF*
Gap pattern ID				*gp0*
Layer 3 filtering				*Enabled*
T310 timer			ms	*0*
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CSI reporting		Config 1		CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH				TCI.State.2
CSI-RS for tracking		Config 1		TRS.2.1 TDD
T1			s	0.2
T2			s	9.68
T3			s	9.68
D1			s	9.64
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit	Test 1					
			T1	T2	T3	T1	T2	T3
AoA setup			Setup 3 defined in A.3.15					
			AoA1			AoA2		
Assumption for UE beams Note 5			Rough			Rough		
EPRE ratio of PDCCH DMRS to SSS		dB	4			Not sent		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0					
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
ssb-Index 0 SNR	Config 1	dB	2 Note 6	-6 Note 6	-15			
ssb-Index 1 SNR	Config 1		Not sent			2 Note 6	-15	-15
N_{oc}	Config 1	dBm/15kHz	-92.1			-92.1		
Time multiplexing of the downlink transmissions from each AoA			Defined in Figure A.7.5.1.1.1-2					
Propagation condition			TDL-A 30ns 75Hz			TDL-A 30ns 75Hz		
Note 1: OCNG shall be used such a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband								

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
	Value
gapOffset	0

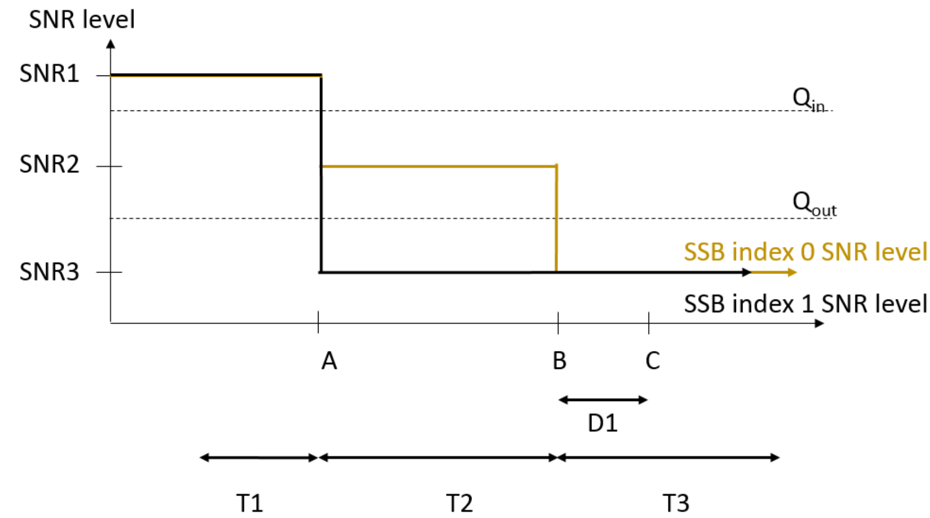

Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

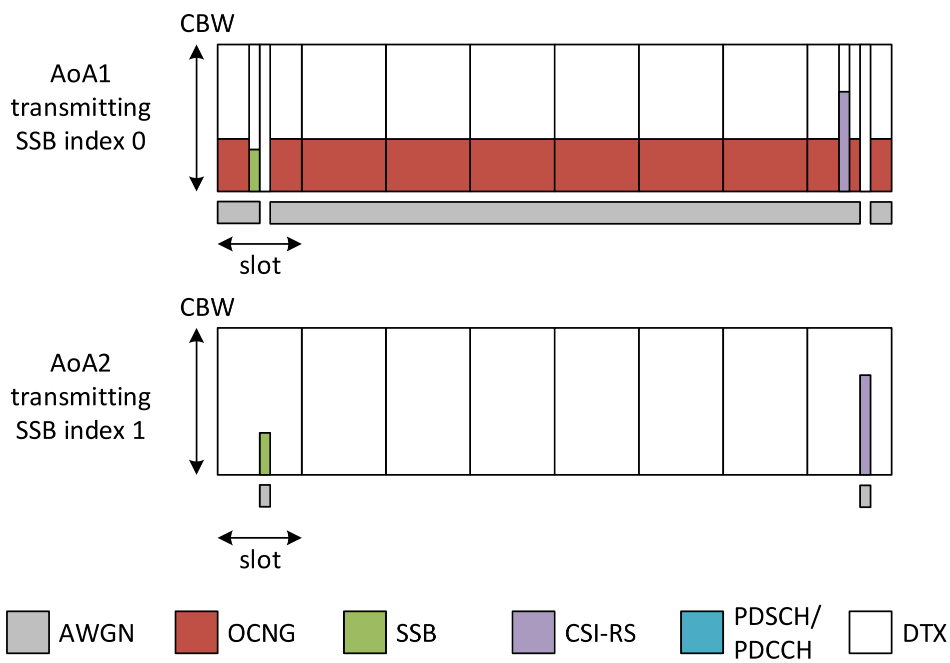

Figure A.7.5.1.1.1-2: Time multiplexed downlink transmissions

A.7.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.7.5.1.2.1-1.The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
$BW_{channel}$	Config 1		100: $N_{RB,c}$ = 66
Data RBs allocated	Config 1		24
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
TDD Configuration	Config 1		TDDConf.3.1
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.3
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
PRACH Configuration	Config 1		Table A.3.8.3.4
SSB index assigned as RLM RS	Config 1		0,1
OCNG parameters			OP. 5
CP length			Normal
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			*OFF*
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	4000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH			TCI.State.2
CSI-RS for tracking	Config 1		TRS.2.1 TDD
T1		s	0.2

T2	s	0.2
T3	s	1.88
T4	s	0.2
T5	s	3.84
D1	s	3.8
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.		

Table A.7.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit	Test 1									
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup			Setup 3 defined in A.3.15									
			AoA1					AoA2				
Assumption for UE beams Note 5			Rough					Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0					Not sent				
EPRE ratio of PDCCH to PDCCH DMRS		dB	0									
EPRE ratio of PBCH DMRS to SSS		dB										
EPRE ratio of PBCH to PBCH DMRS		dB										
EPRE ratio of PSS to SSS		dB										
EPRE ratio of PDSCH DMRS to SSS		dB										
EPRE ratio of PDSCH to PDSCH DMRS		dB										
EPRE ratio of OCNG DMRS to SSS		dB										
EPRE ratio of OCNG to OCNG DMRS		dB										
ssb-Index 0 SNR	Config 1	dB	2 Note 6	-6 Note 6	-15	-4.5	2 Note 6					
ssb-Index 1 SNR	Config 1		Not sent					2 Note 6	-15	-15	-15	-15
N_{oc}	Config 1	dBm/15kHz	-92.1					-92.1				
Time multiplexing of the downlink transmissions from each AoA			Defined in Figure A.7.5.1.2.1-2									
Propagation condition			TDL-A 30ns 75Hz					TDL-A 30ns 75Hz				
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband												

Table A.7.5.1.2.1-4: Void

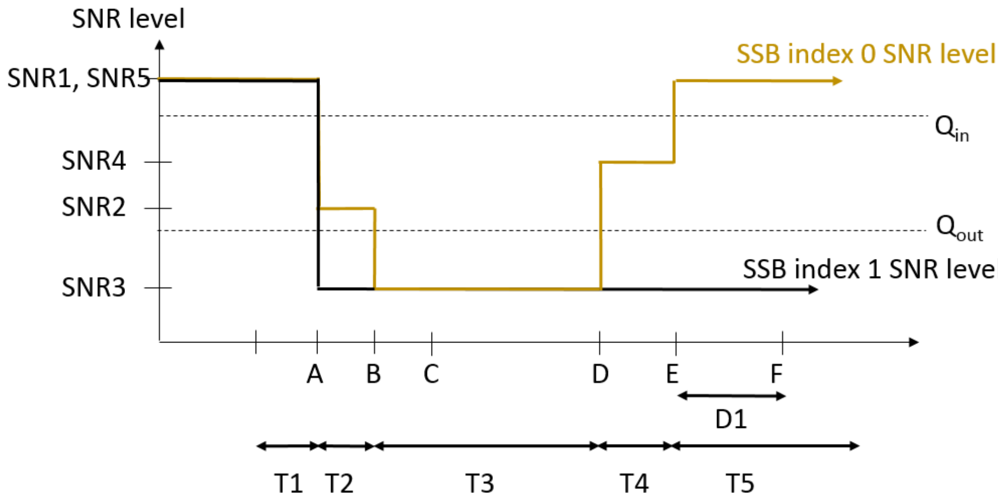

Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

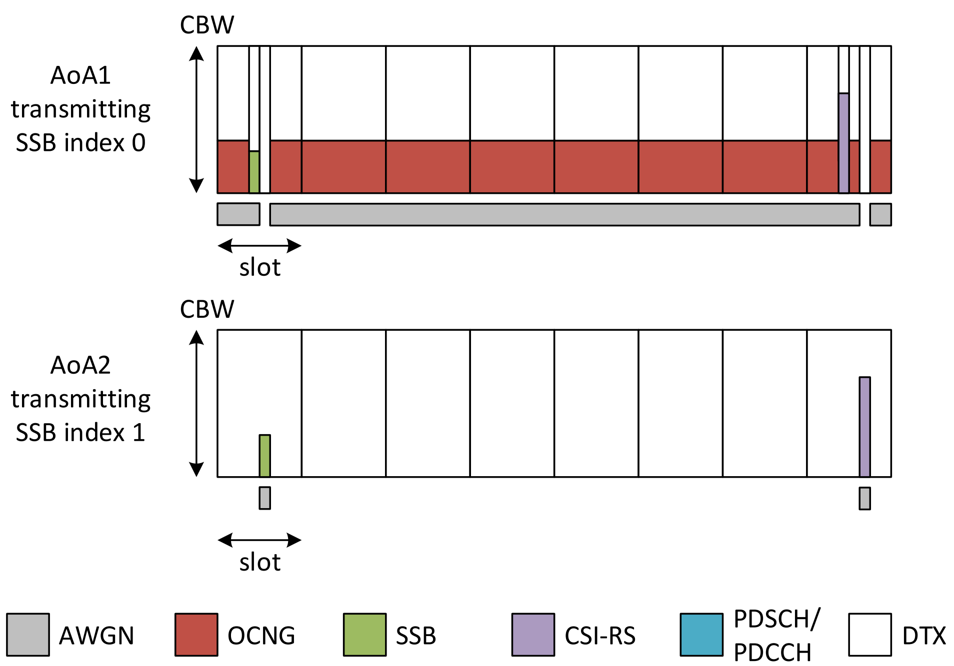

Figure A.7.5.1.2.1-2: Time multiplexed downlink transmissions

A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
$BW_{channel}$	Config 1		100: $N_{RB,c}$ = 66
Data RBs allocated	Config 1		66
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
TDD Configuration	Config 1		TDDConf.3.1
CORESET Reference Channel	Config 1		CR.3.1 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
PRACH Configuration	Config 1		Table A.3.8.3.4
SSB index assigned as RLM RS	Config 1		0,1
OCNG parameters			OP.1
CP length			Normal
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	*0*
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH			TCI.State.2
CSI-RS for tracking	Config 1		TRS.2.1 TDD
T1		s	0.2
T2		s	14.48
T3		s	14.48
D1		s	14.44
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
AoA setup			Setup 1 defined in A.3.15		
Assumption for UE beams Note 5			Rough		
EPRE ratio of PDCCH DMRS to SSS		dB	4		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0		
EPRE ratio of PBCH DMRS to SSS		dB	0		
EPRE ratio of PBCH to PBCH DMRS		dB			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
ssb-Index 0 SNR	Config 1	dB	2 Note 6	-6 Note 6	-15
ssb-Index 1 SNR	Config 1		2 Note 6	-15	-15
N_{oc}	Config 1	dBm/15KHz	-104.7dBm		
Propagation condition			TDL-A 30ns 75Hz		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.1.3.1-4: Void

Table A.7.5.1.3.1-5: Void

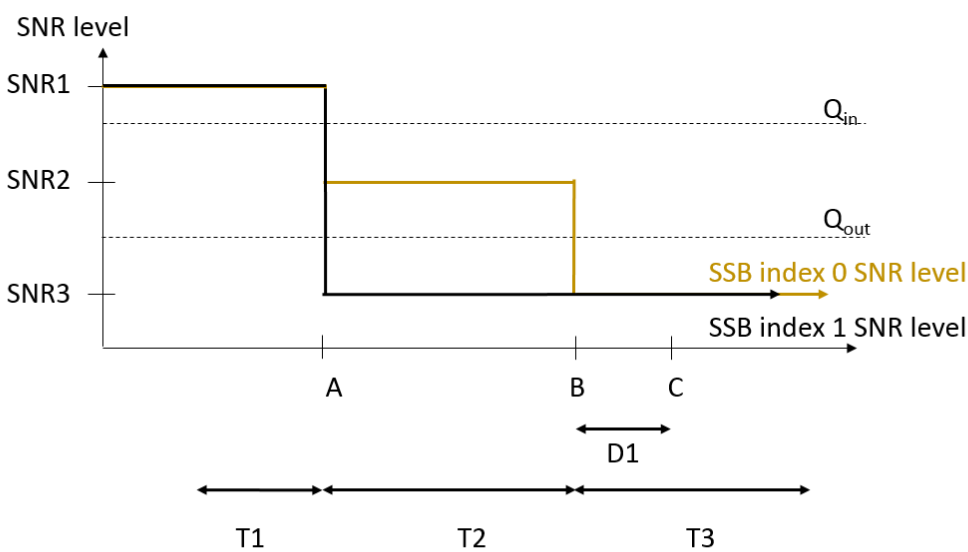

Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
$BW_{channel}$	Config 1		100: $N_{RB,c}$ = 66
Data RBs allocated	Config 1		66
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
TDD Configuration	Config 1		TDDConf.3.1
CORESET Reference Channel	Config 1		CR.3.1 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.3
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
PRACH Configuration	Config 1		Table A.3.8.3.4
SSB index assigned as RLM RS	Config 1		0,1
OCNG parameters			OP.1
CP length			Normal
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.11
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	4000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH			TCI.State.2
CSI-RS for tracking	Config 1		TRS.2.1 TDD
T1		s	0.2
T2		s	0.2

T3	s	2.8
T4	s	0.2
T5	s	3.88
D1	s	3.84
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.		

Table A.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams Note 5			Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB	0				
EPRE ratio of PBCH DMRS to SSS		dB	0				
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
ssb-Index 0 SNR	Config 1	dB	2 Note 6	-6 Note 6	-15	-4.5	2 Note 6
ssb-Index 1 SNR	Config 1		2 Note 6	-15	-15	-15	-15
N_{oc}	Config 1	dBm/15KHz	-104.7dBm				
Propagation condition			TDL-A 30ns 75Hz				
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3 Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband.							

Table A.7.5.1.4.1-4: Void

Table A.7.5.1.4.1-5: Void

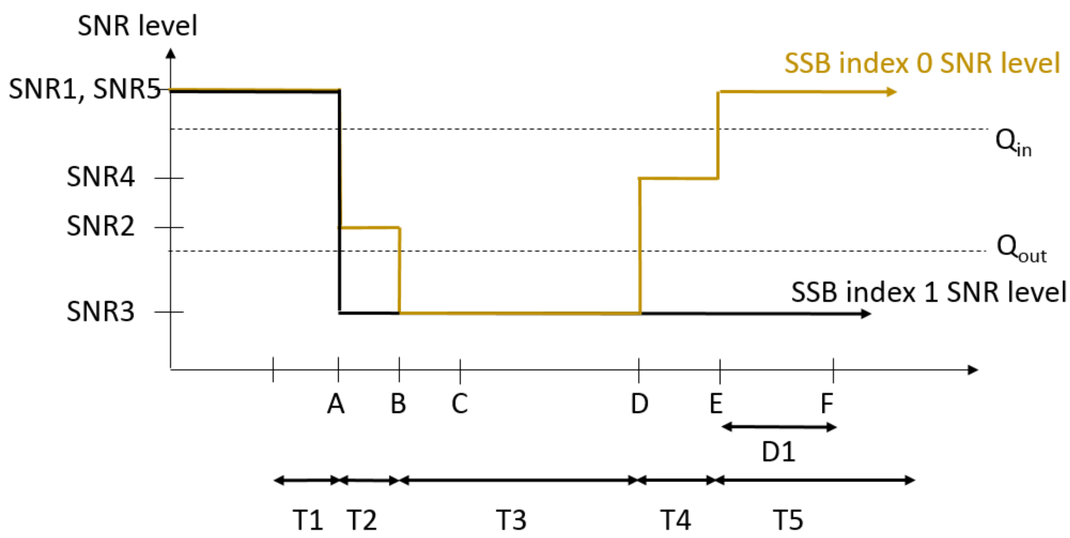

Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.5.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for PDCCH#1/PDSCH			TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
OCNG parameters			OP.2
CP length			Normal
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			**gp0*
Layer 3 filtering			*Enabled*
T310 timer		ms	*0*
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
T1		s	0.2
T2		s	0.35
T3		s	0.35
D1		s	0.31
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1					
			T1	T2	T3	T1	T2	T3
AoA setup			Setup 3 defined in A.3.15					
			AoA1			AoA2		
Assumption for UE beams [Note 10]			Rough			Rough		
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4			Not sent		
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB						
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0					
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB						
EPRE ratio of PSS to SSSSSS_beta		dB						
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR on RLM-RS1	Config 1	dB	2[Note 11]	-6[Note 11]	-15			
SNR on RLM-RS2	Config 1		Not sent			2[Note 11]	-14	-15
N_{oc}	Config 1	dBm/15kHz	-92.1			-92.1		
Propagation condition			TDL-C 300ns 100Hz			TDL-C 300ns 100Hz		
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1. Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.5.1-1. Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband								

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1
	Value
gapOffset	0
Note 1: RLM RS is partially overlapped with measurement gap	

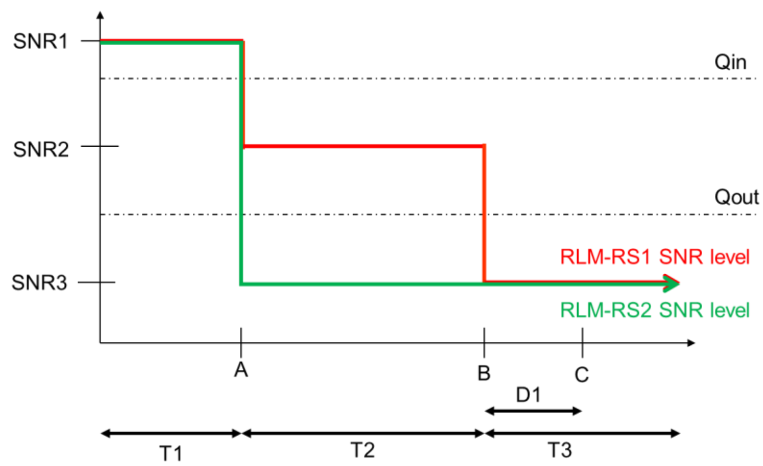

Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 second after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for PDCCH#1/PDSCH			TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
OCNG parameters			OP.2
CP length			Normal
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	1000

T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
T1		s	0.2
T2		s	0.2
T3		s	0.24
T4		s	0.2
T5		s	0.88
D1		s	0.84
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1									
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup			Setup 3 defined in A.3.15									
			AoA1					AoA2				
Assumption for UE beams [Note 10]			Rough					Rough				
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4					Not sent				
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB										
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0									
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB										
EPRE ratio of PSS to SSSSSS_beta		dB										
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB										
EPRE ratio of PDSCH to PDSCH DMRS		dB										
EPRE ratio of OCNG DMRS to SSS		dB										
EPRE ratio of OCNG to OCNG DMRS		dB										
SNR on RLM-RS1	Config 1	dB	2 [Note 11]	-6 [Note 11]	-15	-4.5	2 [Note 11]					
SNR on RLM-RS2	Config 1		Not sent					2 [Note 11]	-14	-15	-15	-14
N_{oc}	Config 1	dBm/15KHz	-92.1					-92.1				
Propagation condition			TDL-C 300ns 100Hz					TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.6.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

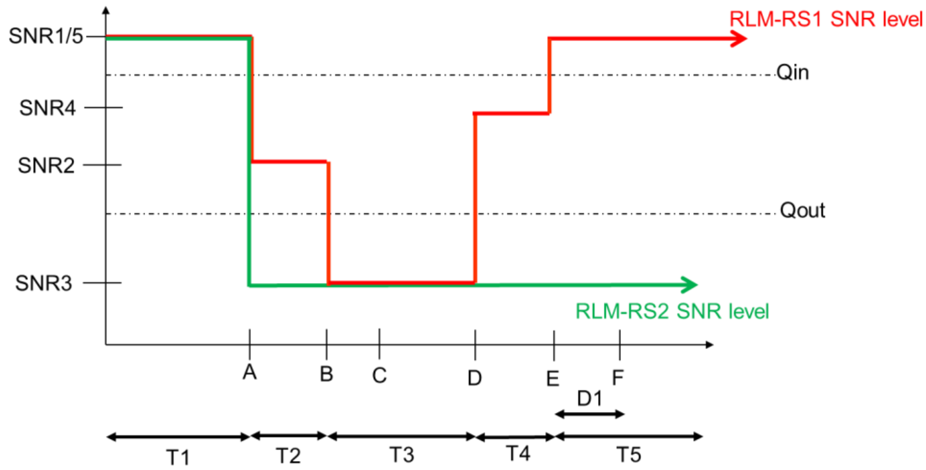

Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for PDCCH#1/PDSCH			TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			*Enabled*
T310 timer		ms	*0*
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
T1		s	0.2
T2		s	1.28
T3		s	1.28
D1		s	1.24
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
AoA setup		dB	Setup 1 defined in A.3.15		
Assumption for UE beams Note 10			Rough		
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4		
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB			
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0		
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB			
EPRE ratio of PSS to SSSSSS_beta		dB			
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on RLM-RS1	Config 1	dB	2 Note 11	-6 Note 11	-15
SNR on RLM-RS2	Config 1	dB	2 Note 11	-14	-15
N_{oc}	Config 1	dBm/15KHz	-104.7		
Propagation condition			TDL-C 300ns 100Hz		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.7.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

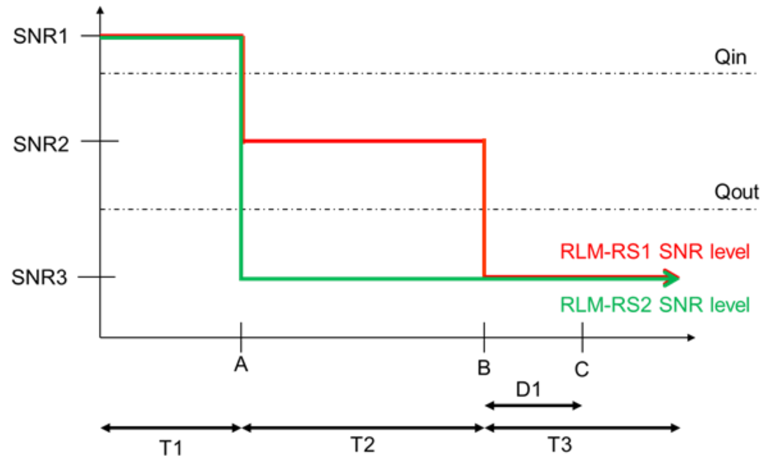

Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 secondafter the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for PDCCH#1/PDSCH			TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			*[*gp0*]
Layer 3 filtering			*Enabled*
T310 timer		ms	*2000*

T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
T1		s	0.2
T2		s	0.2
T3		s	1.64
T4		s	0.2
T5		s	1.88
D1		s	1.84
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup		dB	Setup 1 defined in A.3.15				
Assumption for UE beams Note 10			Rough				
EPRE ratio of PDCCH DMRS to SSSPDCCH_beta		dB	4				
EPRE ratio of PDCCH to PDCCH DMRSPDCCH_DMRS_beta		dB					
EPRE ratio of PBCH DMRS to SSSPBCH_beta		dB	0				
EPRE ratio of PBCH to PBCH DMRSPSS_beta		dB					
EPRE ratio of PSS to SSSSSS_beta		dB					
EPRE ratio of PDSCH DMRS to SSS PDSCH_beta		dB					
EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG DMRS to SSS							
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS1	Config 1	dB	2 Note 11	-6 Note 11	-15	-4.5	2 Note 11
SNR on RLM-RS2	Config 1	dB	2 Note 11	-14	-15	-15	-14
N_{oc}	Config 1	dBm/15KHz	-104.7				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Test 1
	Value
gapOffset	0

Note 1: RLM RS is partially overlapped with measurement gap

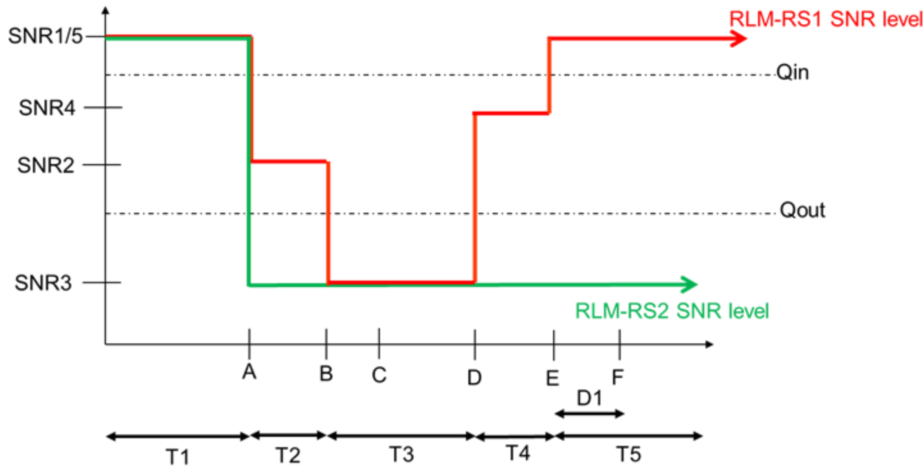

Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1	1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC pattern 1	
DRX cycle length	s	1	OFF	
T1	s	1	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Cell 1	
AoA setup		1	Setup 3 defined in A.3.15.3	
			AoA1	AoA2
Assumption for UE beams Note 1			Rough	Rough
TDD configuration		1	TDDConf.3.1	
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66	
Data RBs allocated		1	24	
PDSCH Reference measurement channel		1	SR.3.2 TDD	Not sent
RMSI CORESET RMC configuration		1	CR.3.1 TDD	Not sent
Dedicated CORESET RMC configuration		1	CCR.3.2 TDD	Not sent
TRS configuration		1	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI state		1	TCI.State.2	N/A
OCNG Pattern		1	OP.5 defined in A.3.2.1	Not sent
Initial DL BWP configuration		1	DLBWP.0.1	
Initial UL BWP configuration		1	ULBWP.0.1	
RLM-RS		1	SSB with index 0	SSB with index 1
N_{oc}	dBm/15kHz	1	-92.1	-92.1
N_{oc} Note2	dBm/SCS	1	-83.1	-83.1
$\hat{E}_s/N_{oc}$	dB	1	2	2
$\hat{E}_s/I_{ot\ BB}$ Note 4	dB	1	1	1
SSB_RP Note3	dBm/SCS	1	-81.1	-81.1
Io	dBm/95.04 MHz	1	-54.35	-54.35
Time multiplexing of the downlink transmissions from each AoA		1	Defined in Figure A.7.5.1.9.1-1	
Propagation Condition		1	AWGN	AWGN

Note 1: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

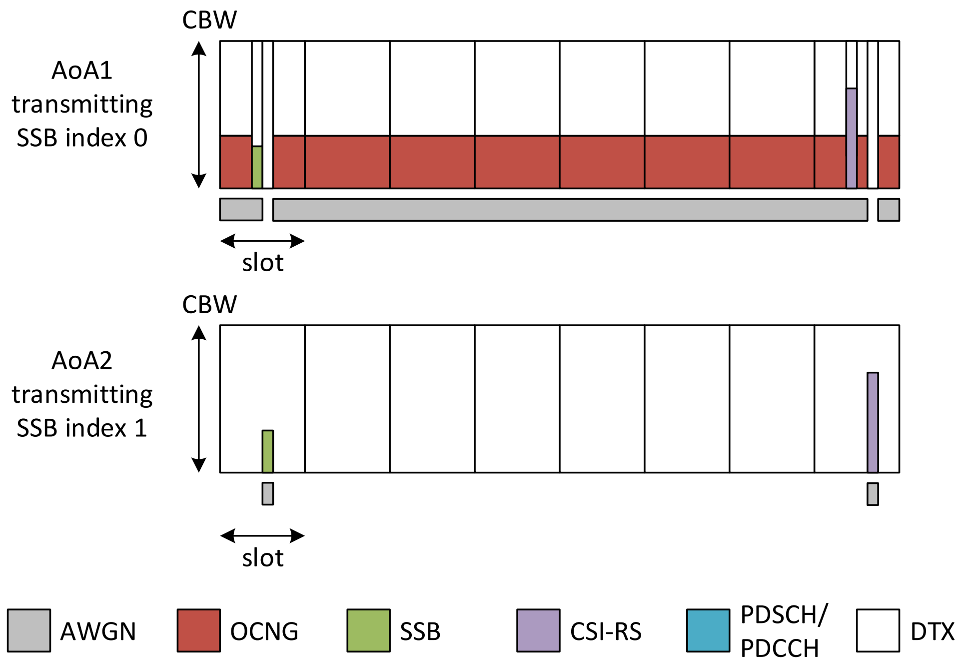

Figure A.7.5.1.9.1-1: Time multiplexed downlink transmissions

A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.7.5.2 Interruption

A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD – TDD duplex mode

Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	s	10	

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell1	Cell2
Frequency Range			FR2	
Duplex mode			TDD	
TDD configuration			TDDConf.3.1	
$BW_{channel}$			100 MHz: $N_{RB,c}$ = 66	
Data RBs allocated			66	
Initial DL BWP Configuration			DLBWP.0.2[Note4]	
Initial UL BWP Configuration			ULBWP.0.2 [Note6]	
Downlink dedicated BWP Configuration			DLBWP.1.1	
Uplink dedicated BWP configuration			ULBWP.1.1	
PDSCH Reference measurement channel			SR.3.1 TDD	
RMSI CORESET parameters			CR.3.1 TDD	
Dedicated CORESET parameters			CCR.3.1 TDD	
OCNG Patterns			OP.1	
SMTC Configuration			SMTC.1	
SSB Configuration			SSB.1 FR2	
TCI State			TCI.State.0	
TRS Configuration			TRS.2.1 TDD	
Correlation Matrix and Antenna Configuration			1x2 Low	
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Time offset to Cell1 [Note 3]		µs	-	3
Propagation Condition			AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of of TS 38.213 [3].

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell 1	Cell 2
Angle of arrival configuration			Setup1 according to table A.3.15.1	Setup 1according to table A.3.15.1
Assumption for UE beams Note 6			Rough	Rough
N_{oc} Note1	NR_TDD_FR2_A	dBm/15kHz	-104.7	-104.7
	NR_TDD_FR2_B			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
N_{oc} Note1	NR_TDD_FR2_A	dBm/SCS	-95.7	-95.7
	NR_TDD_FR2_B			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
SSB_RP Note2	NR_TDD_FR2_A	dBm/120KHz Note3	-88.7	-88.7
	NR_TDD_FR2_B			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
$\hat{E}_s/N_{oc}$		dB	7	7
$\hat{E}_s/I_{ot}$		dB	7	7
Io Note2	NR_TDD_FR2_A	dBm/95.04 MHz Note4	-58.92	-58.92
	NR_TDD_FR2_B			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.				

A.7.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 4 slots before an SMTC and no later than 4 slots after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-2.

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.2.2 SA interruptions at NR SRS carrier-based switching

A.7.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit aperiodic SRS, the UE can perform SRS carrier-based switching to a carrier not configured for PUCCH/PUSCH transmission from a carrier with PUCCH/PUSCH transmission. The test will partly verify the interruption requirements on PCell in clause 8.2.2.2.9.

A.7.5.2.2.2 Test Parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the FR2 PCell. Cell 2 is an activated FR2 SCell on the TDD SCC which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell.The test parameters for PCell and SCell are given in Tables A.7.5.2.2.2-2, A.7.5.2.2.2-3, and A.7.5.2.2.2-4 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. Immediately at the beginning of T2, the UE is triggered for SRS switching. The UE shall be scheduled on PCell continuously throughout the test.

The test equipment verifies that potential interruption is carried out correctly by monitoring ACK/NACK sent in PCell.

Table A.7.5.2.2.2-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.7.5.2.2.2-2: General test parameters for SA interruptions at NR SRS carrier-based switching

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1
Configured SCell		Cell 2	Activated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of PCell
T1	s	5	
T2	ms	100	UE shall perform SRS switching during T2

Table A.7.5.2.2.2-3: Cell-specific test parameters for SA interruptions at NR SRS carrier-based switching

Parameter		Unit	Cell 1	Cell 2
Frequency Range			FR2	
Duplex mode	Config 1		TDD	
TDD configuration	Config 1		TDDConf.3.1	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	
Downlink initial BWP Configuration	Config 1		DLBWP.0.1	
Downlink dedicated BWP Configuration	Config 1		DLBWP.1.1	
Uplink initial BWP configuration	Config 1		ULBWP.0.1	
Uplink dedicated BWP configuration	Config 1		ULBWP.1.1	
SRS configuration	Config 1		SRS.3 TDD	
TRS configuration	Config 1		TRS.2.1 TDD	
TCI state	Config 1		TCI.State.0	
PDSCH Reference measurement channel	Config 1		SR.3.1 TDD	
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD	
RMC CORESET Reference Channel	Config 1		CCR.3.1 TDD	
OCNG Patterns			OP.1	
SSB Configuration			SSB.1 FR2	
SMTC Configuration	Config 1		SMTC.1	
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
$\hat{E}_s/N_{oc}$		dB	17	
Propagation Condition			AWGN	
NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.				

Table A.7.5.2.2.2-4: OTA related test parameters

Parameter	Unit	Test 1	
		T1	T2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1	
Assumption for UE beams Note 6		Fine	
N_{oc} Note 1	dBm/15kHz Note 4	-112	
N_{oc} Note 1	dBm/SCS Note 3	-103	
$\hat{E}_s/N_{oc}$	dB	4	
SS-RSRP Note 2	dBm/SCS Note 4	-99	
$\hat{E}_s/I_{ot}$	dB	4	
Io Note2	dBm/95.04 MHz Note 4	-68.5	

NOTE 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.
NOTE 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.
NOTE 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.2.2.3 Test Requirements

During T2, interruption on PCell due to SRS carrier-based switching between Cell 1 and Cell 2 shall not exceed the required values specified in clause 8.2.2.2.9.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.3 SCell Activation and Deactivation Delay

A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and 2, respectively.

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter[Note 5]	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3
SSB ARFCN		freq1			freq2		
Duplex mode		TDD					
TDD configuration		TDDConf.3.1					
Downlink initial BWP Configuration		DLBWP.0.1					
Downlink dedicated BWP Configuration		DLBWP.1.1					
Uplink initial BWP configuration		ULBWP.0.1					
Uplink dedicated BWP configuration		ULBWP.1.1					
TRS configuration		TRS.2.1 TDD					
TCI state		TCI.State.0					
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66					
Data RBs allocated		66		66		66	
PDSCH Reference measurement channel		SR.3.1 TDD			-		
RMSI CORESET Parameters		CR.3.1 TDD			-		
Dedicated CORESET Parameters		CCR.3.1 TDD			-		
OCNG Patterns		OP.1					
SSB Configuration		SSB.1 FR2					
SMTC Configuration		SMTC.1					
CSI-RS configuration for CSI reporting		CSI-RS.3.1 TDD					
reportConfigType		periodic			N/A		
reportQuantity		cri-RI-CQI			N/A		
CSI reporting periodicity	slot	40			N/A		
CSI reporting offset	slot	4			N/A		
EPRE ratio of PSS to SSS	dB	0					
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS							
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS[Note 1]							
EPRE ratio of OCNG to OCNG DMRS [Note 1]							
Propagation conditions		AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void Note 5: Void							

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

Parameter	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3
Angle of arrival configuration		Setup 1 according to table A.3.15.1			Setup 1 according to table A.3.15.1		
Assumption for UE beams Note 7		Rough			Rough		
N_{oc} Note1	dBm/15kHz Note4	-104.7			-104.7		
N_{oc} Note1	dBm/SCS Note3	-95.7			-95.7		
$\hat{E}_s/N_{oc}$	dB	7			7		
SSB_RP Note2	dBm/SCS Note4	-88.7			-88.7		
$\hat{E}_s/I_{ot}$	dB	7			7		
Io Note2	dBm/95.04 MHz Note4	-58.92			-58.92		

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Void
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: Void
Note 6: Void
Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation\_time}$ will be replaced with the value $T_{FirstSSB}$ + 5ms as defined in clause 8.3.

A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+$T_{L1\text{-}RSRP}$. In the next DL slot after slot m+$T_{L1\text{-}RSRP}$, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3	PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE is only required to pass in one of the supported test configurations	

Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case

Parameter[Note 5]		Unit	Cell 1			Cell 2		
			T1	T2			T1	T2
SSB ARFCN			Freq1			Freq2		
Duplex mode	Config 1		FDD			TDD		
	Config 2,3		TDD					
TDD configuration	Config 1		Not Applicable			TDDConf.3.1		
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
Downlink initial BWP Configuration	Config 1,2,3		DLBWP.0.1					
Downlink dedicated BWP Configuration	Config 1,2,3		DLBWP.1.1					
Uplink initial BWP configuration	Config 1,2,3		ULBWP.0.1					
Uplink dedicated BWP configuration	Config 1,2,3		ULBWP.1.1					
TRS configuration	Config 1,2,3		N/A			TRS.2.1 TDD		
TCI state	Config 1,2,3		TCI.State.0					
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52			100: $N_{RB,c}$ = 66		
	Config 3		40: $N_{RB,c}$ = 106					
Data RBs allocated	Config 1,2		52	66	52	66	52	66
	Config 3		106		106		106	
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			-		
	Config 2		SR.1.1 TDD					
	Config 3		SR.2.1 TDD					
RMSI CORESET Parameters	Config 1		CR.1.1 FDD			-		
	Config 2		CR.1.1 TDD					
	Config 3		CR.2.1 TDD					
Dedicated CORESET Parameters	Config 1		CCR.1.1 FDD			-		
	Config 2		CCR.1.1 TDD					
	Config 3		CCR.2.1 TDD					
OCNG Patterns			OP.1					
SSB configuration	Config 1,2		SSB.1 FR1			SSB.3 FR2		
	Config 3		SSB.2 FR1					
CSI-RS configuration for CSI reporting	Config 1~3		N/A			N/A	CSI-RS.3.1 TDD Note 6	CSI-RS.3.1 TDD
reportConfigType for CSI reporting			periodic			N/A		
reportConfigType for L1-RSRP			periodic			N/A		
reportQuantity for CSI reporting			cri-RI-CQI			N/A		
reportQuantity for L1-RSRP			ssb-Index-RSRP			N/A		
CSI reporting periodicity	Config 1,2	slot	5			N/A		
	Config 3		10					
L1-RSRP reporting periodicity Note 7	Config 1,2	slot	5			N/A		
	Config 3		10					
CSI reporting offset	Config 1,2	slot	2			N/A		
	Config 3		4					
L1-RSRP reporting offset	Config 1,2	slot	2			N/A		
	Config 3		4					
SMTC configuration			SMTC.1					
EPRE ratio of PSS to SSS		dB	0					
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH to PBCH_DMRS								

EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS			
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation conditions		N/A Link only, see clause A.3.7A	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void Note 5: All parameters apply for configuration 1, 2 and 3 Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+$T_{L1\text{-}RSRP}$ during T2. Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1.			

Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

Parameter		Unit	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
Angle of arrival configuration			N/A			According to clause A.3.15.1		
Assumption for UE beams Note 7			N/A			Rough		
N_{oc} Note 1	Config 1,2,3	dBm/15kHz	Link only, see clause A.3.7A			-104.7		
N_{oc} Note 1	Config 1,2,3	dBm/SCS				-95.7		
$\hat{E}_s/N_{oc}$	Config 1,2,3	dB				-∞	7	7
$\hat{E}_s/I_{ot}$	Config 1,2,3	dB				-∞	7	7
SSB_RP Note 2, Note 4	Config 1,2,3	dBm/SCS				-∞	-88.7	-88.7
Io Note 2, Note 4	Config 1,2,3	dBm/95.04 MHz				-66.68	-58.92	-58.92
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: Void Note 6: Void Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation.								

A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+$T_{L1\text{-}RSRP}$), where $T_{L1\text{-}RSRP}$ is no larger than

3ms + $T_{FirstSSB\_MAX}$ + 15*T_{SMTC_MAX} + 8*T_{rs} + $T_{L1\text{-}RSRP,\ measure}$ + $T_{L1\text{-}RSRP,\ report}$

as defined in clause 8.3.2. For this test case, $T_{FirstSSB\_MAX}$=T_{SMTC_MAX}=T_{rs}=20ms; $T_{L1\text{-}RSRP,\ measure}$=160ms and $T_{L1\text{-}RSRP,\ report}$=5ms, which allows $T_{L1\text{-}RSRP}$ 680 ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{T_{HARQ}+T_{activtion\_time}+T_{CSI\_Reporting}}{NR\ slot\ length}$, where

- T_{HARQ} is defined in Table A.5.5.3.1.1-2

- $T_{activation\_time}$ = 3ms + $T_{FirstSSB\_MAX}$ + 15*T_{SMTC_MAX} + 8*T_{rs} + $T_{L1\text{-}RSRP,\ measure}$ + $T_{L1\text{-}RSRP,\ report}$ + max {(T_{HARQ} + $T_{uncertainty\_MAC}$ + 5ms + $T_{FineTiming}$), ($T_{uncertainty\_RRC}$ + T_{RRC_delay})}, which allows 710 ms

- $T_{CSI\_Reporting}$ = 10ms

- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot $m + 1 + \frac{T_{HARQ}}{\text{NR slot length}}$ to $m + 1 + \frac{T_{HARQ}+3ms+T_X}{\text{NR slot length}}$, as defined in clause 8.3, where T_X =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $n + 1 + \frac{T_{HARQ}}{NR\ slot\ length}$ to $n + 1 + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

A.7.5.3.3 SCell Activation and deactivation for SCell in FR2 inter-band in non-DRX

A.7.5.3.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell and SCell are in FR2 inter-band.

The supported test configurations are shown in table A.7.5.3.3.1-1 below. The general test parameters are described in Tables A.7.5.3.3.1-2, and cell specific test parameters are described in Tables A.7.5.3.3.1-3. OTA related test parameters are shown in table A.7.5.3.3.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell. A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m.

The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2. During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+$T_{L1\text{-}RSRP}$. In the next DL slot after slot m+$T_{L1\text{-}RSRP}$, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.3.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.3.1-2: General test parameters for FR2 SCell activation in FR2 inter-band

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2.
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2.
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	≤8	A random value from 0μs to 8μs
T1	s	7	During this time the PCell shall be known and the SCell configured and detected.
T2	s	2	During this time the UE shall activate the SCell.
T3	s	1	During this time the UE shall deactivate the SCell.
T_{HARQ}	ms	k_1×NR slot length	k_1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
$T_{CSI\_Reporting}$	ms	2	the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]

Table A.7.5.3.3.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

Parameter Note 5	Unit	T1		T2		T3	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TDD		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1		TDDConf.3.1	
Downlink initial BWP Configuration		DLBWP.0.1		DLBWP.0.1		DLBWP.0.1	
Downlink dedicated BWP Configuration		DLBWP.1.1		DLBWP.1.1		DLBWP.1.1	
Uplink initial BWP configuration		ULBWP.0.1		ULBWP.0.1		ULBWP.0.1	
Uplink dedicated BWP configuration		ULBWP.1.1		ULBWP.1.1		ULBWP.1.1	
TRS configuration		TRS.2.1 TDD		TRS.2.1 TDD		TRS.2.1 TDD	
TCI state		TCI.State.0		TCI.State.0		TCI.State.0	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Parameters		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated CORESET Parameters		CCR.3.1 TDD	-	CCR.3.1 TDD	-	CCR.3.1 TDD	-
CSI-RS configuration		NA	NA	NA	CSI-RS.3.1 TDD Note 2	NA	CSI-RS.3.1 TDD
CSI reporting periodicity Note 3		NA	5	NA	5	NA	5
OCNG Patterns		OP.1					
SSB Configuration		SSB.1 FR2					
SMTC Configuration		SMTC.1					
EPRE ratio of PSS to SSS	dB	0					
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS							
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS Note 1							
EPRE ratio of OCNG to OCNG DMRS Note 1							
Propagation conditions		AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+$T_{L1\text{-}RSRP}$ during T2. Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1.							

Table A.7.5.3.3.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

Parameter[Note 6]	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3
AoA setup		Setup 3 as specified in clause A.3.15					
		AoA1			AoA2		
Assumption for UE beams [Note 7]		Rough			Rough		
N_{oc} [Note1]	dBm/15kHz[Note4]	-92.1			-92.1		
N_{oc} [Note1]	dBm/SCS[Note3]	-83.1			-83.1		
$\hat{E}_s/N_{oc}$	dB	0			0		
SS-RSRP[Note2]	dBm/SCS [Note4]	-83.1			-83.1		
$\hat{E}_s/I_{ot}$	dB	0			0		
Io[Note2]	dBm/95.04 MHz [Note4]	-51.1			-51.1		

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6: All parameters apply for configuration 1
Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.3.3.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell in the configured slots for CSI reporting after slot (m+k). UE shall send the first CSI report for SCell in slot (m+k), or in the next available uplink resource for CSI reporting if slot (m+k) was subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2, the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+$T_{L1\text{-}RSRP}$), where $T_{L1\text{-}RSRP}$ is no larger than 3ms + $T_{FirstSSB\_MAX}$ + 15*T_{SMTC_MAX} + 8*T_{rs} + $T_{L1\text{-}RSRP,\ measure}$ + $T_{L1\text{-}RSRP,\ report}$ as defined in clause 8.3.2. For this test case, $T_{FirstSSB\_MAX}$=T_{SMTC_MAX}=T_{rs}=20ms; $T_{L1\text{-}RSRP,\ measure}$=480ms and $T_{L1\text{-}RSRP,\ report}$=5ms, which allows $T_{L1\text{-}RSRP}$ =1000ms.

During T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{T_{HARQ}+T_{activtion\_time}+T_{CSI\_Reporting}}{NR\ slot\ length}$, where

- T_{HARQ} is defined in Table A.7.5.3.3.1-2
- $T_{activation\_time}$ = 3ms + $T_{FirstSSB\_MAX}$ + 15*T_{SMTC_MAX} + 8*T_{rs} + $T_{L1\text{-}RSRP,\ measure}$ + $T_{L1\text{-}RSRP,\ report}$ + max {(T_{HARQ} + $T_{uncertainty\_MAC}$ + 5ms + $T_{FineTiming}$), ($T_{uncertainty\_RRC}$ + T_{RRC_delay})}, which allows 1030ms
- $T_{CSI\_Reporting}$ = 10ms
- NR slot length is 0.125ms for this test case.

During T2, the interruption of PCell during SCell activation shall not happen outside the slot $m + 1 + \frac{T_{HARQ}}{\text{NR slot length}}$ to $m + 1 + \frac{T_{HARQ}+3\text{ms}+T_X}{\text{NR slot length}}$, where T_X =20ms.

During T3, the UE shall stop sending CSI reports for SCell no later than slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3.

During T3, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $n + 1 + \frac{T_{HARQ}}{NR\ slot\ length}$ to $n + 1 + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$ as defined in clause 8.3.

A.7.5.3.4 Direct SCell activation at SCell addition of known SCell in FR2

A.7.5.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the delay and interruption for direct SCell activation delay at SCell addition are within the requirements stated in clause 8.3.4.

The supported test configurations are shown in Table A.7.5.3.4.1-1 below. The general test parameters are given in Table A.7.5.3.4.1-2 and cell-specific test parameters in Table A.7.5.3.4.1-3. OTA related test parameters are shown in Table A.7.5.3.4.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two FR2 carriers and two NR cells. Before the test starts the UE is connected to Cell 1 (PCell) on carrier #1, but is not aware of Cell 2 on NR carrier #2. Cell 1 and Cell 2 have constant signal levels throughout the test. The UE is monitoring the PCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 is monitored by the UE. During T1, Cell 2 should be detected and measured by the UE such that it meets the condition for known cell defined in clause 8.3.4 for direct SCell activation.

Time period T2 starts when the *RRCReconfiguration* message for the configuration and activation of Cell 2 (the SCell), which is sent from the test equipment, is received at the UE antenna connector in a slot # denoted m. The test equipment shall set the parameter *sCellState* to *activated* for the SCell, which causes Cell 2 to become configured and activated.

Time period T3 starts at ($m + N_{direct}$), at which point UE shall be reporting a valid CQI for both PCell and SCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation of SCell. The test equipment verifies the activation time by counting the slots from the time when the SCell activation message is sent until a CQI report with other than CQI index 0 is received.

Table A.7.5.3.4.1-1: Supported test configurations

Configuration	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.3.4.1-2: General test parameters

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channels (1,2) in FR2 are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured and activated SCell		Cell 2	Configured and activated SCell on NR RF channel number 2.
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
SCell measurement cycle (measCycleSCell)	ms	160	
T1	s	7	During this time the measurement for Cell 2 is configured, and Cell 2 is detected.
T2	s	N_{direct}	During this time the UE shall configure and activate Cell 2 as SCell.
T3	ms	100	During this time the UE shall report valid CQI for both PCell and SCell.
T_{HARQ}	ms	$k_1 \times$NR slot length	k_1 is a number of slots indicated by the PDSCH-to-HARQ_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3]
k	slot	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe},\mu} + 1$	As specified in clause 4.3 of TS 38.213 [3]

Table A.7.5.3.4.1-3: Cell specific test parameters

Parameter	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3

SSB ARFCN			freq1	freq2
Duplex mode	Config 1		TDD	
TDD configuration	Config 1		TDDConf.3.1	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	
DL initial BWP configuration	Config 1		DLBWP.0.1	
DL dedicated BWP configuration	Config 1		DLBWP.1.1	
UL initial BWP configuration	Config 1		ULBWP.0.1	
UL dedicated BWP configuration	Config 1		ULBWP.1.1	
Timing offset to Cell 1		ms	Not Applicable	0
PDSCH Reference measurement channel	Config 1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD	CR.3.1 TDD
RMC CORESET Reference Channel	Config 1		CCR.3.1 TDD	CCR.3.1 TDD
TRS configuration	Config 1		TRS.2.1 TDD	TRS.2.1 TDD
CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	CSI-RS.3.1 TDD
CSI reporting periodicity	Config 1	ms	5	5
OCNG Patterns			OP.1	
SMTC configuration			SMTC.1	
SSB configuration	Config 1		SSB.1 FR2	SSB.1 FR2
EPRE ratio of PSS to SSS		dB	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation condition		-	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.				

Table A.7.5.3.4.1-4: OTA related test parameters

Parameter[Note 6]	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3

Angle of arrival configuration		Setup 1 according to A.3.15.1	
Assumption for UE beams Note 7		Rough	Rough
N_{oc} Note1	dBm/15kHz Note4	-112	-112
N_{oc} Note1	dBm/SCS Note 3	-102.97	-102.97
$\hat{E}_s/N_{oc}$	dB	14	14
SS-RSRP Note2	dBm/SCS Note4	-88.97	-88.97
$\hat{E}_s/I_{ot}$	dB	14	14
Io Note2	dBm/95.04 MHz Note4	-59.81	-59.81

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6: All parameters apply for configuration 1
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.5.3.4.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{N_{direct}}{NR\ slot\ length}$, where

$$N_{direct} = T_{RRC\_Process} + T_1 + T_{activation\_time} + T_{CSI\_Reporting} - 3ms,$$

- $T_{RRC\_Process}$ = 16ms, which is the RRC procedure delay defined for SCell addition in clause 12 of TS 38.331 [2],
- T_1 is the delay from slot m + $T_{RRC\_Process}$ until the transmission of *RRCReconfigurationComplete* message,
- $T_{activation\_time}$ = $T_{FirstSSB}$+ 5ms = 25ms,
- $T_{CSI\_Reporting}$ = 10ms

This gives a total of N_{direct} = 16 + T_1 + 25 + 10 - 3 = (48 + T_1) ms, and NR slot length is 0.125ms.

During T3 the UE shall send CSI reports for SCell with non-zero CQI index and continue to send CSI reports for SCell with non-zero CQI index until the end of T3.

During T2 interruption of PSCell during SCell activation shall not happen outside the window from slot m+1 to slot $m+1+\frac{T_{RRC\_Process}+T_1+T_X}{NR\ slot\ length}$ as defined in clause 8.3.4, where T_X =20ms.

The interruption of PCell due to activation of SCell shall not be more than the values specified for NR SA in clause 8.2.2.2.11.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot $m + \frac{N_{direct}}{NR\ slot\ length}$ as defined in clause 8.3.4 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.7.5.3.5 Direct SCell activation at handover with known SCell in FR2

A.7.5.3.5.1 Test Purpose and Environment

This test is to verify the requirements specified in sub clause 8.3.5 for the FR2 handover with direct SCell activation.

The test scenario comprises of three FR2 cells, one source PCell (Cell 1), one target PCell (Cell 2) and one SCell (Cell 3). The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell (Cell 1). Both Cell 2 and Cell 3 are known to UE and UE is reporting CQI for all Cell 1.

Time period T2 starts when UE receives a handover command that initiate handover of UE to Cell2 and also activates Cell 3. This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the Cell 3. The message is sent from the test equipment to the UE and is received in a slot number n at the UE antenna connector. The UE shall accomplish the handover, addition and activation of the SCell no later than slot (n +$\frac{N_{direct}}{NR\ slot\ length}$).

Time period T3 starts at (n +$\frac{N_{direct}}{NR\ slot\ length}$), at which point UE shall be reporting a valid CSI for both Cell 2 and Cell 3 as given in tables A.7.5.3.5.1-1 and A.7.5.3.5.1-2.

Table A.7.5.3.5.1-1: Supported test configurations for FR2 handover with direct SCell activation case

Configuration	Description
1	SCell: NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.3.5.1-2: General test parameters for FR2 handover with direct SCell activation case

Parameter		Unit	Value	Comment
RF Channel Number			1, 2, 3	Three NR radio channels are used for this test, Cell 1, Cell2 and Cell 3 use RF channel 1, 2 and 3 respectively.
A4-Offset		dBm	-120	
Time offset between cells			3 μs	Synchronous cells
Initial conditions	Source cell		Cell 1	Source Cell
	Target cell		Cell 2	Neighbour cell
	SCell		Cell 3	SCell is not added and activated
Final condition	Source cell		Cell 2	Cell 2 is Source cell after handover
	Neighbour cell		Cell 1	Neighbour cell
	SCell		Cell 3	SCell is added and activated

Table A.7.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter Note 5	Unit	T1			T2			T3		
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3
SSB ARFCN		freq1	freq2	freq 3	freq1	freq2	freq 3	freq1	freq2	freq3
Duplex mode		TDD			TDD			TDD		
TDD configuration		TDDConf.3.1			TDDConf.3.1			TDDConf.3.1		
Downlink initial BWP Configuration		DLBWP.0.1			DLBWP.0.1			DLBWP.0.1		
Downlink dedicated BWP Configuration		DLBWP.1.1			DLBWP.1.1			DLBWP.1.1		
Uplink initial BWP configuration		ULBWP.0.1			ULBWP.0.1			ULBWP.0.1		
Uplink dedicated BWP configuration		ULBWP.1.1			ULBWP.1.1			ULBWP.1.1		
TRS configuration		TRS.2.1 TDD			TRS.2.1 TDD			TRS.2.1 TDD		
TCI state		TCI.State.0			TCI.State.0			TCI.State.0		
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66			100: $N_{RB,c}$ = 66			100: $N_{RB,c}$ = 66		
PDSCH Reference measurement channel		SR.3.1 TDD		-	SR.3.1 TDD		-	SR.3.1 TDD		
RMSI CORESET Parameters		CR.3.1 TDD		-	CR.3.1 TDD		-	CR.3.1 TDD		
Dedicated CORESET Parameters		CCR.3.1 TDD		-	CCR.3.1 TDD		-	CCR.3.1 TDD		
OCNG Patterns		OP.1								
SSB Configuration		SSB.1 FR2								
SMTC Configuration		SMTC.1								
PRACH configuration		FR2 PRACH configuration 1								
EPRE ratio of PSS to SSS	dB	0								
EPRE ratio of PBCH_DMRS to SSS										
EPRE ratio of PBCH to PBCH_DMRS										
EPRE ratio of PDCCH_DMRS to SSS										
EPRE ratio of PDCCH to PDCCH_DMRS										
EPRE ratio of PDSCH_DMRS to SSS										
EPRE ratio of PDSCH to PDSCH_DMRS										
EPRE ratio of OCNG DMRS to SSS Note 1										
EPRE ratio of OCNG to OCNG DMRS Note 1										
Propagation conditions		AWGN								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Void

Table A.7.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case

Parameter Note 6	Unit	Cell 1			Cell 2			Cell 3		
		T1	T2	T3	T1	T2	T3	T1	T2	T3
Angle of arrival configuration		Setup 1 according to table A.3.15.1			Setup 1 according to table A.3.15.1			Setup 1 according to table A.3.15.1		
Assumption for UE beams Note 7		Rough			Rough			Rough		
N_{oc} Note1	dBm/15kHz Note4	-112			-112			-112		
N_{oc} Note1	dBm/SCS Note 3	-102.97			-102.97			-102.97		
$\hat{E}_s/N_{oc}$	dB	14			14			14		
SS-RSRP Note2	dBm/SCS Note4	-88.97			-88.97			-88.97		
$\hat{E}_s/I_{ot}$	dB	14			14			14		
Io Note2	dBm/95.04 MHz Note4	-88.80			-88.80			-88.80		

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6: Void
Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.3.5.2 Test Requirements

The UE shall be capable to transmit valid CSI report for PCell (Cell 2) and to the directly activated SCell1 no later than in slot n+ N_{direct}.

The SCell activation delay, N_{direct}, can be expressed as: $N_{direct} = T_{RRC\_process} + T_{interrupt} + T_2 + T_3 + T_{activation\_time} + T_{CSI\_Reporting}$ - 3ms; Where:

- $T_{RRC\_Process}$: RRC procedure delay defined in clause 12 of TS 38.331 and it is equal to 16ms,
- $T_{interrupt}$: Interruption time during handover as specified in clause 6.1.1. The value to be verified in the test is 52 ms ($T_{interrupt}$ = 0 ms for T_{search} + 10ms for T_{IU} + 20 ms for $T_{processing}$ + 20ms for T_{Δ} + 2 ms for T_{margin} ms) by assuming known SCell and SMTC.1 configuration.
- T_2: Delay from slot $n+\frac{T_{RRC\_Process}+T_{interrupt}}{\text{NR slot length}}$ until UE has obtained a valid TA command for the target PCell,
- T_3: Delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to k+1 slot, where k is defined in clause 4.2 in TS 38.213,
- $T_{activation\_time}$ and $T_{CSI\_Reporting}$ are specified in clause 8.3.2, where the following definitions of $T_{FirstSSB}$ and $T_{FirstSSB\_MAX}$ as defined in section 8.3.5 shall apply:

During time period T2 of the test, the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot $n+\frac{T_{HARQ}+T_{activtion\_time}+T_{CSI\_Reporting}}{NR\ slot\ length}$, $T_{activation\_time} = T_{SMTC\_SCell}$ + 5ms, as defined in clause 8.3.

During time period T3 of the test, the UE shall stop sending CSI reports for SCell at latest in a slot $m+\frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3.

During time period T2 of the test, interruption of PCell / PSCell during SCell activation shall not happen outside the slot $n+1+\frac{T_{\text{HARQ}}}{\text{NR slot length}}$ to $n+1+\frac{T_{\text{HARQ}}+3\text{ms}+T_{\text{X}}}{\text{NR slot length}}+N_{\text{interruption}}$, as defined in clause 8.3.

During time period T3 of the test, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $\text{m}+1+\frac{\text{T}_{\text{HARQ}}}{NR\ slot\ length}$ to $\text{m}+1+\frac{\text{T}_{\text{HARQ}}+3\text{ms}}{NR\ slot\ length}$, as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During time period T2 of the test, if there are no uplink resources for reporting the valid CSI in a slot $\frac{\text{T}_{\text{HARQ}}+T_{\text{activtion\_time}}+T_{\text{CSI\_Reporting}}}{NR\ slot\ length}$ as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.7.5.4 Void

A.7.5.5 Beam Failure Detection and Link recovery procedures

A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth
2	TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR2	

Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1, 2		TDD	
$BW_{channel}$	Config 1, 2		100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1, 2		66	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
TDD Configuration	Config 1, 2		TDDConf.3.1	
CORESET Reference Channel	Config 1, 2		CR. 3.1 TDD	
SSB Configuration	Config 1		SSB.1 FR2	
	Config 2		SSB.2 FR2	
SMTC Configuration	Config 1, 2		SMTC.3	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		120 KHz	
PRACH Configuration	Config 1, 2		FR2 PRACH configuration 2	A.3.8.3
SSB index assigned as BFD RS (q_0)			0	
SSB index assigned as CBD RS (q_1)			1	
OCNG parameters			OP.1	
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0	

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	
Gap pattern ID			gp0	
gapOffset			0	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1	dBm/SSB SCS	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
	Config 2		-91.5	
powerControlOffsetSS				Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for CSI reporting	Config 1, 2		CSI-RS.3.1 TDD	
TCI states			TCI.State.0	
CSI-RS for tracking	Config 1, 2		TRS.2.1 TDD	
SSB index assigned as RLM RS			0, 1	
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	2.61	
T3		s	1.64	
T4		S	0	
T5		s	1.01	
D1		s	0.97	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

Editor's note: An additional RS for RLM, different from BFD-RS at constant high SNR shall be configured as part of the test configuration.

Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams Note 10			Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5 Note 11	-3 Note 11	-12	-12	-12
	Config 2		5 Note 11	-3 Note 11	-12	-12	-12
SNR_SSB of set q_1	Config 1	dB	0.2	0.2	20.2	20.2	20.2
	Config 2		0.2	0.2	20.2	20.2	20.2
SSB_RP of set q_1	Config 1	dBm/SSB SCS	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2		-101.5	-101.5	-81.5	-81.5	-81.5
N_{oc}	Config 1	dBm/120 KHz	-104.7				
	Config 2		-104.7				
Propagation condition			TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE hich supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.1.1-4: Void

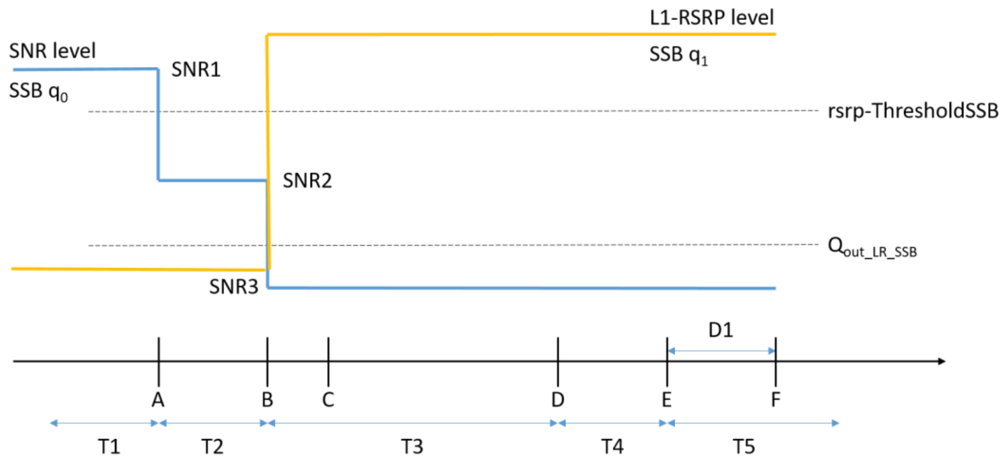

Figure A.7.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

A.7.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and

DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth
2	TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR2	

Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Value	Comment
		Test 1	

Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1, 2		TDD	
$BW_{channel}$	Config 1, 2		100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1, 2		66	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
TDD Configuration	Config 1, 2		TDDConf.3.1	
RMSI CORESET Reference Channel	Config 1		CR. 3.1 TDD	
	Config 2		CR.3.2 TDD	
SSB Configuration	Config 1		SSB.1 FR2	
	Config 2		SSB.2 FR2	
SMTC Configuration	Config 1, 2		SMTC.3	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		120 KHz	
PRACH Configuration	Config 1, 2		FR2 PRACH configuration 2	A.3.8.3
SSB index assigned as BFD RS (q_0)			0	
SSB index assigned as CBD RS (q_1)			1	
OCNG parameters			OP.1	
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.3	A.3.3.3
Gap pattern ID			N.A.	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1	dBm/SSB SCS	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
	Config 2		-91.5	
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17

				of TS 38.321 [7]
CSI-RS configuration for CSI reporting	Config 1, 2		CSI-RS.3.1 TDD	A.3.14.2
TCI states			TCI.State.0	
CSI-RS for tracking	Config 1, 2		TRS.2.1 TDD	
SSB index assigned as RLM RS			0, 1	
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	3.37	
T3		s	2.8	
T4		s	0	
T5		s	0.61	
D1		s	0.57	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams Note 10			Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5 Note 11	-3 Note 11	-12	-12	-12
	Config 2		5 Note 11	-3 Note 11	-12	-12	-12
SNR_SSB of set q_1	Config 1	dB	0.2	0.2	20.2	20.2	20.2
	Config 2		0.2	0.2	20.2	20.2	20.2
SSB_RP of set q_1	Config 1	dBm/SSB SCS	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2		-101.5	-101.5	-81.5	-81.5	-81.5
N_{oc}	Config 1	dBm/120 KHz	-104.7				
	Config 2		-104.7				
Propagation condition			TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.2.1-4: Void

Table A.7.5.5.2.1-5: Void

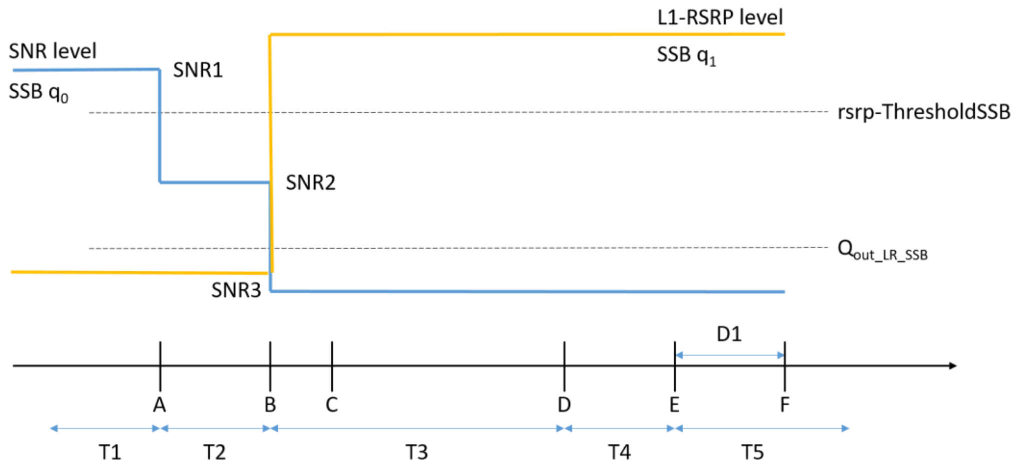

Figure A.7.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1		66	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB. 1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH subcarrier spacing	Config 1		120KHz	
PRACH Configuration	Config 1		FR2 PRACH configuration 4	A.3.8.3
csi-RS-Index assigned as beam failure detection RS in set q_0			0	
TRS configuration			TRS.2.1 TDD	
PDSCH/PDCCH TCI state			TCI.State.2	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	
Gap pattern ID			N.A.	
csi-RS-Index assigned as candidate beam detection RS in set q_1			1	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).

rsrp-ThresholdSSB		dBm/SCS kHz	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0 and q_1	Config 1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned as RLM RS			0, 1	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	1.17	
T3		s	0.9	
T4		s	0	
T5		s	0.31	
D1		s	0.27	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumptpion for UE beams Note 10			Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q_0	Config 1	dB	5 Note 11	-3 Note 11	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q_1	Config 1	dBm/SCS kHz	-104.5	-104.5	-84.5	-84.5	-84.5
N_{oc}	Config 1	dBm/15 KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.3.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.3.1-4: Void

Table A.7.5.5.3.1-5: Void

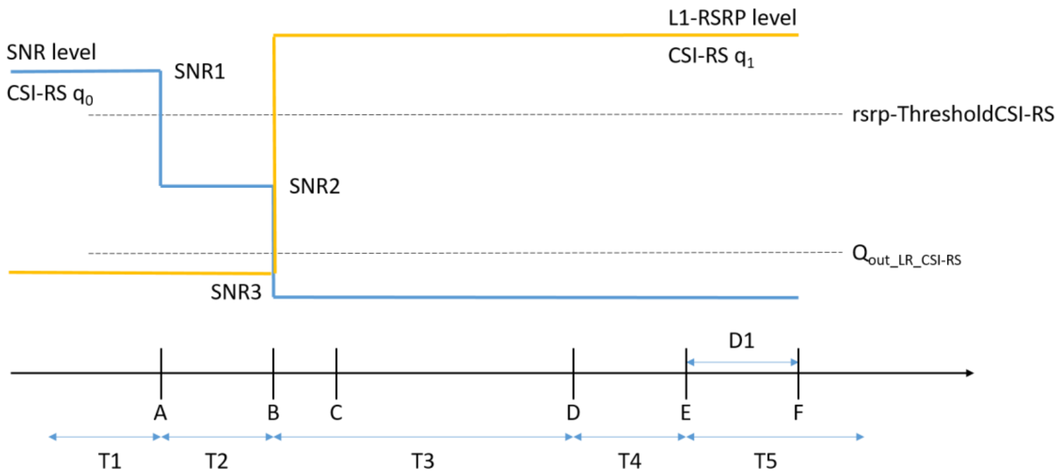

Figure A.7.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the

CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.4.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1		66	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB. 1 FR2	A.3.10
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	
PRACH Configuration	Config 1		FR2 PRACH configuration 4	A.3.8.3
csi-RS-Index assigned as beam failure detection RS in set q_0			0	
TRS configuration			TRS.2.1 TDD	
PDSCH/PDCCH TCI state			TCI.State.2	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.3	A.3.3.3
Gap pattern ID			N.A.	
csi-RS-Index assigned as candidate beam detection RS in set q_1			1	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).

rsrp-ThresholdSSB		dBm/SCS kHz	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0 and q_1	Config 1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned as RLM RS	Config 1		CSI-RS.3.2 TDD	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	5.43	
T3		s	5.16	
T4		s	0	
T5		s	0.31	
D1		s	0.27	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.5.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams Note 10			Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q_0	Config 1	dB	5 Note 11	-3 Note 11	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q_1	Config 1	dBm/SCS kHz	-104.5	-104.5	-84.5	-84.5	-84.5
N_{oc}	Config 1	dBm/120 KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.4.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.4.1-4: Void

Table A.7.5.5.4.1-5: Void

Table A.7.5.5.4.1-6: Void

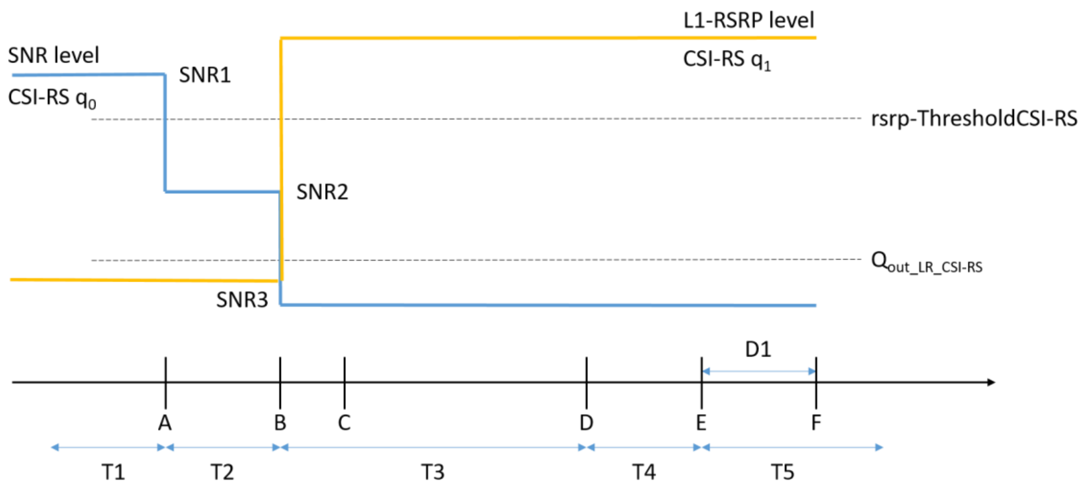

Figure A.7.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.7.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
$BW_{channel}$	Config 1	MHz	100: $N_{RB,c}$ = 66	
Data RBs allocated	Config 1		66	
TDD Configuration	Config 1		TDDConf.3.1	
DL initial BWP configuration	Config 1		DLBWP.0.1	
DL dedicated BWP configuration	Config 1		DLBWP.1.1	
UL initial BWP configuration	Config 1		ULBWP.0.1	
UL dedicated BWP configuration	Config 1		ULBWP.1.1	
CORESET Reference Channel	Config 1		CR. 3.1 TDD	
SSB Configuration	Config 1		SSB.1 FR2	
SMTC Configuration	Config 1		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	
PRACH Configuration	Config 1		FR2 PRACH configuration 2	A.3.8.3
SSB index assigned as BFD RS (q_0)			0	
SSB index assigned as CBD RS (q_1)			1	
TRS configuration			TRS.2.1 TDD	
TCI configuration			TCI.State.0	
OCNG parameters			OP.1	
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	DRX is not in use
Gap pattern ID			N.A.	No measurement gap pattern is configured
ssb-Index			2	Number of SSB indexes used for beam failure

				detection
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the 10%
rsrp-ThresholdSSB		dBm/SCS kHz	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer			pbfd4	see TS 38.321 [7], clause 5.17
CSI Configuration for reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	2.6	
T3		s	1.64	
T4		s	0	
T5		s	1.01	
D1		s	0.97	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5

AoA Setup			Setup1 defined in A.3.15.1				
Assumption for UE beams Note 10			Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5 Note 11	-3 Note 11	-12	-12	-12
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-104.5	-104.5	-84.5	-84.5	-84.5
SNR_SSB of set q_1	Config 1	dB	-12	-12	5	5	5
N_{oc}	Config 1	dBm/15 KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

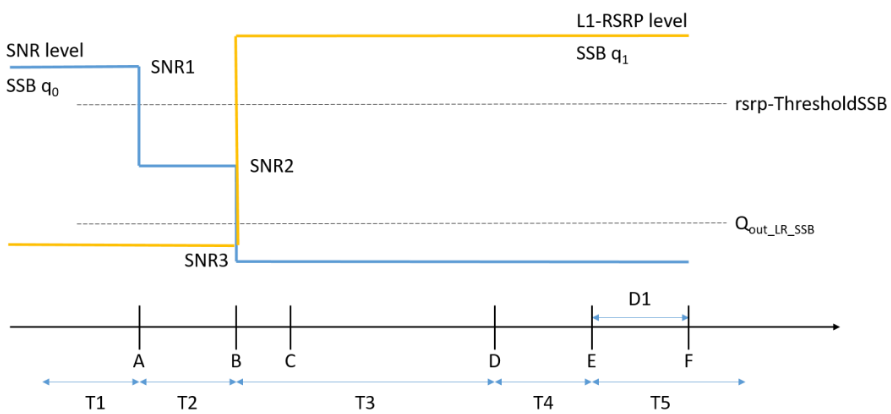

Figure A.7.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.7.5.5.6 Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for an active SCell and that the UE performs correct CSI-RS-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.6.1-1, A.7.5.5.6.1-2 and A.7.5.5.6.1-3. There are two cells, cell 1 is the active PCell and cell 2 is the active SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.6.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active SCell to emulate CSI-RS based beam failure. Figure A.7.5.5.6.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled.

Table A.7.5.5.6.1-1: Supported test configurations for FR2 PCell and SCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.6.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Value	Comment
		Test 1	

Active PCell			Cell 1	
RF Channel Number			1	
Active SCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB.3 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH subcarrier spacing	Config 1		120KHz	
PRACH Configuration	Config 1		Table A.3.8.3.1-1	
csi-RS-Index assigned as beam failure detection RS in set q_0 in activated SCell			0	
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	

DRX			OFF	
Gap pattern ID			N.A.	
schedulingRequestID-BFR-SCell-r16			Configured	
Periodicity of PUCCH for SR configuration for BFR on SCell		slots	40	5ms
Offset of PUCCH for SR configuration for BFR on SCell		slots	5	
PUCCH parameters for SR configuration for BFR on SCell			Table 8.3.3.1.2-1 in [13]	
csi-RS-Index assigned as candidate beam detection RS in set q_1 in activated SCell			1	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm/SCS kHz	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			NA	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0 and q_1	Config 1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned as RLM RS			0, 1	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	1.17	
T3		s	0.9	
T4		s	0	
T5		s	0.31	
D1		s	0.27	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.5.6.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Cell 1	Test 1 Cell2				
		T1 to T5	T1	T2	T3	T4	T5

AoA setup			Setup 1 defined in A.3.15	Setup 1 defined in A.3.15				
Assumptpion for UE beams Note 10			Rough	Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB						
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_CSI-RS of set q_0	Config 1	dB	5	5	-3	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	0.2	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q_1	Config 1	dBm/SCS kHz	-104.5	-104.5	-104.5	-84.5	-84.5	-84.5
N_{oc}	Config 1	dBm/ 15kHz	-104.7	-104.7				
Propagation condition			TDL-A 30ns 75Hz	TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.6.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

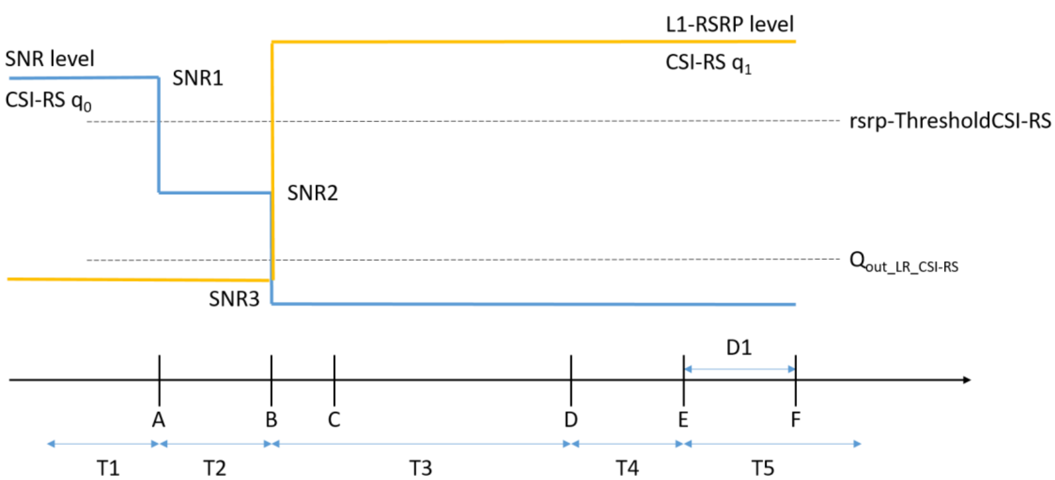

Figure A.7.5.5.6.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in non-DRX mode

A.7.5.5.6.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 in A.7.5.5.6.1 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q_1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.7 Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for an active SCell and that the UE performs correct CSI-RS-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the SCell with *schedulingRequestID-BFR-SCell-r16* configuration, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 SCell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.7.1-1, A.7.5.5.7.1-2 and A.7.5.5.7.1-3. There are two cell, cell 1 is the active PCell and cell 2 is the active SCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.7.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active SCell to emulate CSI-RS based beam failure. Figure A.7.5.5.7.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

Table A.7.5.5.7.1-1: Supported test configurations for FR2 PCell and SCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.7.1-2: General test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Value	Comment
		Test 1	

Active PCell			Cell 1	
RF Channel Number			1	
Active SCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB.3 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	
PRACH Configuration	Config 1		Table A.3.8.3.1-1	
csi-RS-Index assigned as beam failure detection RS in set q_0 in activated SCell			0	
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Beam failure detection transmission parameters	DCI format		1-0	
	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	

DRX			DRX.3	A.3.3.3
Gap pattern ID			N.A.	
schedulingRequestID-BFR-SCell-r16			Configured	
Periodicity of PUCCH for SR configuration for BFR on SCell		slots	40	5ms
Offset of PUCCH for SR configuration for BFR on SCell		slots	5	
PUCCH parameters for SR configuration for BFR on SCell			Table 8.3.3.1.2-1 in [13]	
csi-RS-Index assigned as candidate beam detection RS in set q_1 in activated SCell			1	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm/SCS kHz	-94.5	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q_0 and q_1	Config 1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned as RLM RS	Config 1		CSI-RS.3.2 TDD	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		s	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	5.43	
T3		s	5.16	
T4		s	0	
T5		s	0.31	
D1		s	0.27	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.5.7.1-3: Cell specific test parameters for FR2 SCell for beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Cell1	Test 1 Cell2				
		T1 to T5	T1	T2	T3	T4	T5

AoA setup			Setup 1 defined in A.3.15	Setup 1 defined in A.3.15				
Assumption for UE beams Note 10			Rough	Rough				
EPRE ratio of PDCCH DMRS to SSS		dB	0	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB						
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_CSI-RS of set q_0	Config 1	dB	5	5	-3	-12	-12	-12
SNR_CSI-RS of set q_1	Config 1	dB	0.2	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q_1	Config 1	dBm/SCS kHz	-104.5	-104.5	-104.5	-84.5	-84.5	-84.5
N_{oc}	Config 1	dBm/15 kHz	-104.7	-104.7				
Propagation condition			TDL-A 30ns 75Hz	TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Void
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.7.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

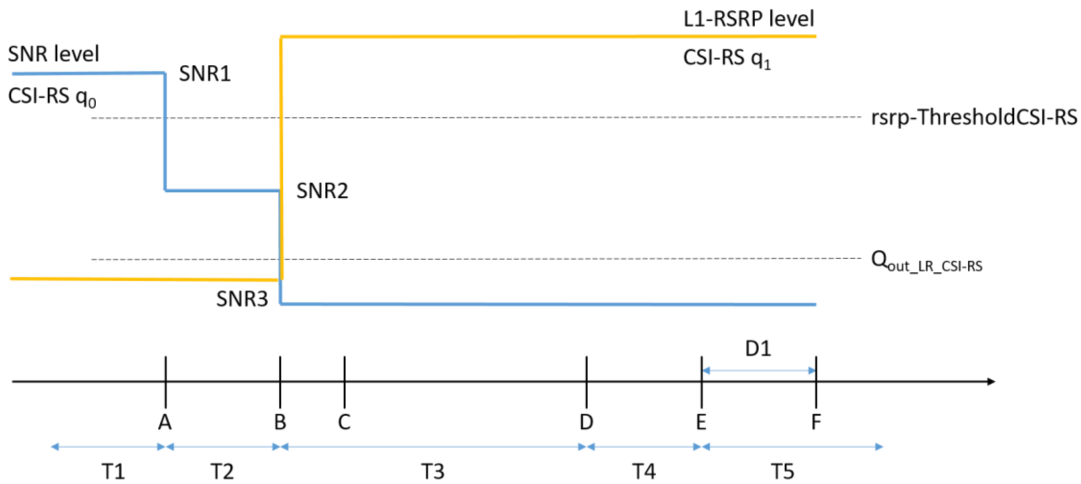

Figure A.7.5.5.7.1-1: SNR and L1-RSRP variation for beam failure detection and link recovery testing for SCell in DRX mode

A.7.5.5.7.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 in A.7.5.5.7.1 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initial link recovery. During T4 and T5 the UE measures and evaluates beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit PUCCH with LRR, followed by BFR MAC CE containing a beam associated with the candidate beam set q_1. The UE shall not transmit PUCCH with an LRR with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.6 Active BWP switch

A.7.5.6.1 DCI-based and Timer-based Active BWP Switch

A.7.5.6.1.1 NR FR2- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted i. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode
Note 1: Void	

Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.7.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1	Cell2
Frequency Range		FR2	FR2
Duplex mode		TDD	
TDD configuration		TDDConf.3.1	
$BW_{channel}$		100 MHz: $N_{RB,c}$ = 66	
Active BWP ID		0	0
Downlink initial BWP Configuration		DLBWP.0.2	
Uplink initial BWP Configuration		ULBWP.0.2	
Downlink active BWP-0 Configuration		DLBWP.0.2	-
Downlink active BWP-1 Configuration		-	DLBWP.1.1
Downlink active BWP-2 Configuration		-	DLBWP.1.3
Uplink active BWP-0 Configuration		ULBWP.0.2	-
Uplink active BWP-1 Configuration		-	ULBWP.1.1
Uplink active BWP-2 Configuration		-	ULBWP.1.3
PDSCH Reference measurement channel		SR.3.1 TDD	
TRS configuration		TRS.2.1 TDD	
TCI state		TCI.State.0	
RMSI CORESET parameters		CR.3.1 TDD	
Dedicated CORESET parameters		CCR.3.1 TDD	
OCNG Patterns		OP.1	
SSB Configuration		SSB.1 FR2	
SMTC Configuration		SMTC.1	
Correlation Matrix and Antenna Configuration		1x2 Low	
EPRE ratio of PSS to SSS	dB	0	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Propagation Condition		AWGN	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.5.6.1.1.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1	Setup 1 defined in clause A.3.15.1
Assumtion for UE beams Note 6		Fine	Fine
N_{oc} Note1	dBm/15kHz	-112	-112
N_{oc} Note1	dBm/SCS	-103	-103
SS-RSRP Note2	dBm/SCS Note3	-85	-85
$\hat{E}_s/I_{ot}$	dB	18	18
Io Note4	dBm/95.04 MHz Note4	-56	-56

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.
Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot (i+$T_{BWPswitchDelay}$+$k1$).

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot (j+$T_{BWPswitchDelay}$+$k1$).

Where, $k1$ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of PCell interruption during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the first UL slot that occurs after the beginning of DL slot (i+ $T_{BWPswitchDelay}$+$k1$), (j+ $T_{BWPswitchDelay}$+$k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.2.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2). The general parameters are given in Table A.7.5.6.1.2.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.2.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the begining of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

Config	Description
1	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.7.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1	Cell2
Frequency Range			FR1	FR2
Duplex mode	Config 1		FDD	TDD
	Config 2,3		TDD	
TDD configuration	Config 1		Not Applicable	TDDConf.3.1
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
$BW_{channel}$	Config 1,2	MHz	10 MHz: $N_{RB,c}$ = 52	100 MHz: $N_{RB,c}$ = 66
	Config 3		40 MHz: $N_{RB,c}$ = 106	
Active BWP ID			0	1, 2
Downlink initial BWP Configuration			DLBWP.0.2	
Uplink initial BWP Configuration			ULBWP.0.2	
Downlink active BWP-0 Configuration			DLBWP.0.2	-
Downlink active BWP-1 Configuration			-	DLBWP.1.1
Downlink active BWP-2 Configuration			-	DLBWP.1.3
Uplink active BWP-0 Configuration			ULBWP.0.2	-
Uplink active BWP-1 Configuration			-	ULBWP.1.1
Uplink active BWP-2 Configuration			-	ULBWP.1.3
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.3.1 TDD
	Config 2		SR.1.1 TDD	
	Config 3		SR.2.1 TDD	
RMSI CORESET parameters	Config 1		CR.1.1 FDD	CR.3.1 TDD
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD	CCR.3.1 TDD
	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
OCNG Patterns			OP.1	
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2
	Config 3		SSB.2 FR1	
TRS configuration	Config 1,2,3		-	TRS.2.1 TDD
TCI state	Config 1,2,3		TCI.State.0	TCI.State.0
SMTC Configuration			SMTC.1	
Correlation Matrix and Antenna Configuration			NA Link only, see clause A.3.7A	1x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation Condition			NA Link only, see clause A.3.7A	AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		-NA Link only, see clause A.3.7A	Setup 1 defined in clause A.3.15.1
Assumption for UE beams Note 6			Fine
N_{oc} Note1	dBm/15kHz		-112
N_{oc} Note1	dBm/SCS		-103
SS-RSRP Note2	dBm/SCS Note3		-85
$\hat{E}_s/I_{ot}$	dB		18
Io Note4	dBm/95.04 MHz Note4		-56

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.
Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

If the UE doesn't support per-FR gap,

- During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

- The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

Otherwise no interruption due to BWP switch on SCell is allowed.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+ T_{BWPswitchDelay}+k1$), ($j+ T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.7.5.6.1.3 NR FR2 DL active BWP switch with non-DRX in SA

A.7.5.6.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.7.5.6.1.3.1-1.

The test scenario comprises of one cell (Cell 1) as given in Table A.7.5.6.1.3.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.6.1.3.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.6.1.3.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell 1's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell 1's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on Cell 1's BWP-2 starting from the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell 1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell 1's DL slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on Cell 1's BWP-1 starting from the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void. Note 2: A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in A.7.5.6.1.3.	

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
T1	s	[0.2]	
T2	s	[0.2]	
T3	s	[0.2]	

Table A.7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
$BW_{channel}$		100 MHz: $N_{RB,c}$ = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna Configuration		1x2 Low
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note 1)		
Propagation Condition		AWGN
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].		

Table A.7.5.6.1.3.1-4: OTA related test parameters for DL BWP switch in SA

Parameter	Unit	Cell 2
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1
Assumption for UE beams Note 6		Fine
N_{oc} Note 1	dBm/15 kHz	-112
N_{oc} Note 1	dBm/SCS	-103
SS-RSRP Note 2	dBm/120 kHz Note3	-85
$\hat{E}_s/I_{ot}$	dB	18
$\hat{E}_s/N_{oc}$ Note 5	dB	18
Io Note2	dBm/95.04 MHz Note4	-56
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone. Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.		

A.7.5.6.1.3.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+ T_{BWPswitchDelay}+k1$), ($j+ T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.7.5.6.2 RRC-based Active BWP Switch

A.7.5.6.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}} + T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}} + T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}} + \mathrm{k1}$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}} + T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$.

$T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.6.2.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	s	[0.2]	

Table A.7.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1
Frequency Range			FR2
Duplex mode			TDD
TDD configuration			TDDConf.3.1
$BW_{channel}$			100 MHz: $N_{RB,c}$ = 66
Active BWP ID			1
Initial Condition	Active DL BWP-1 Configuration		DLBWP.0.2
	Active UL BWP-1 Configuration		ULBWP.1.3
Final Condition	Active DL BWP-1 Configuration		DLBWP.1.1
	Active UL BWP-1 Configuration		ULBWP.1.1
'PDSCH Reference measurement channel			SR.3.1 TDD
RMSI CORESET parameters			CR.3.1 TDD
Dedicated CORESET parameters			CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration			SMTC.1
TCI State			TCI.State.0
TRS Configuration			TRS.2.1 TDD
Antenna Configuration			1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Parameter		Unit	Cell 2
Angle of arrival configuration			Setup 1 according to table A.3.15
Assumption for UE beams Note 5			Fine
N_{oc} Note1	NR_TDD_FR2_A	dBm/15kHz	-112
	NR_TDD_FR2_B		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
N_{oc} Note1	NR_TDD_FR2_A	dBm/SCS	-103
	NR_TDD_FR2_B		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
SS-RSRP Note2	NR_TDD_FR2_A	dBm/SCS Note3	-85
	NR_TDD_FR2_B		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
$\hat{E}_s/I_{ot}$		dB	18
Io Note2	NR_TDD_FR2_A	dBm/95.04 MHz Note4	-56
	NR_TDD_FR2_B		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.			
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone			
Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.			

A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot $i + \frac{T_{\text{RRCprocessingDelay}} + T_{\text{BWPswitchDelayRRC}}}{\text{NR Slot length}}$ and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{\text{RRCprocessingDelay}} + T_{\text{BWPswitchDelayRRC}}}{\text{NR Slot length}} + \text{k1}$.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.6.3 Simultaneous DCI-based and Timer-based Active BWP Switch on multiple CCs

A.7.5.6.3.1 Active BWP switch on multiple SCells with non-DRX in SA

A.7.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of DL BWP switch delay requirement defined in clauses 8.6.2A.1 and 8.6.2B.1, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.3.1.1-1 below. The test scenario comprises one PCell (Cell 1) and two SCells (Cell 2 and Cell 3) as given in Table A.7.5.6.3.1.1-2. NR cell-specific parameters are provided in Table A.7.5.6.3.1.1-3, and OTA related test parameters in Table A.7.5.6.3.1.1-4 below.

The test consists of three consecutive time periods with durations T1, T2 and T3, respectively.

PDCCHs indicating new transmissions shall be transmitted in PCell, SCell1 and SCell2 throughout time periods T1 and T3 to ensure that UE sends ACK/NACKs for PDSCH reception in PCell, SCell1 and SCell2. During T2, there shall be scheduling on PDSCH in PCell only.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (SCell1) on radio channel 2 (SCC1), and Cell 3 (SCell2) on radio channel 3 (SCC2).

UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 1 (PCell). BWP-0 includes the bandwidth of the initial DL BWP and SSB.

UE is configured with two different UE-specific downlink bandwidth parts, BWP-1 and BWP-2, for Cell 2 (SCell1). BWP-1 and BWP-2 include the bandwidth of the initial DL BWP and SSB.

UE is configured with two different UE-specific downlink bandwidth parts, BWP-3 and BWP-4, for Cell 3 (SCell2). BWP-3 and BWP-4 include the bandwidth of the initial DL BWP and SSB.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell1.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-3 in SCell2.

UE is configured with a *bwp-InactivityTimer* timer value for SCell1 and SCell2, respectively.

All cells have constant signal levels throughout the test.

Time period T1 starts when the UE simultaneously receives DCI format 1_1 commands for DL BWP switch in SCell1 and SCell2, respectively, in a slot # denoted *m*. The UE shall switch its SCell1 bandwidth part from BWP-1 to BWP-2, and its SCell2 bandwidth part from BWP-3 to BWP-4. The UE shall be able to receive PDSCH in SCell1 and SCell2 starting from the first DL slot that occurs after slot ($m+T_{MultipleBWPswitchDelay}$) as defined in clause 8.6.2A.1, and to transmit ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after ($m+T_{BWPswitchDelay}+k1$) where *k1* is specified in [7]. The UE shall be continuously scheduled in SCell1 BWP-2 and SCell2 BWP-4 no later than in the first DL slot that occurs after slot ($m+T_{MultipleBWPswitchDelay}$). The starting time of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall occur within the BWP switching delay. The length of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall fulfill requirements in clause 8.2.2.2.5.

Time period T2 starts when the test equipment ceases to schedule the UE on PDSCH in SCell1 and SCell2, thereby causing the *bwp-InactivityTimer* timers for SCell1 and SCell2 to be running until expiry.

Time period T3 starts at the beginning of the first DL half-subframe immediately after the earliest of the *bwp-InactivityTimer* timers expires, in a slot # denoted *n.* The UE shall switch its SCell1 bandwidth part from BWP-2 to BWP-1, and its SCell2 bandwidth part from BWP-4 to BWP-3. The UE shall be able to receive PDSCH in SCell1 and SCell2 starting from the first DL slot that occurs after slot ($n+T_{MultipleBWPswitchDelay}$) as defined in clause 8.6.2B.1, and to transmit ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after slot ($n+T_{MultipleBWPswitchDelay}+k1$). The UE shall be continuously scheduled in SCell1 BWP-1 and SCell2 BWP-3 no later than in the first DL slot that occurs after slot ($n+T_{MultipleBWPswitchDelay}$). The starting time of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall occur within the BWP switching delay. The length of any interruption on PCell due to DL BWP switching of SCell1 and SCell2 shall fulfill requirements in clause 8.2.2.2.5.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch commands are received or *bwp-InactivityTimer* timers expire until ACK/NACKs are sent in SCell1 and SCell2, respectively.

The test equipment verifies that potential interruptions of PCell due to DL BWP switching on SCell1 and SCell2 are carried out within the correct time span, and are within the correct length, by monitoring ACK/NACKs sent in PCell for PCell.

Table A.7.5.6.3.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode

Table A.7.5.6.3.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2, 3	Three NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell1		Cell 2	SCell1 on RF channel number 2.
Active SCell2		Cell 3	SCell2 on RF channel number 3.
CP length		Normal	
DRX		OFF	
sCellDeactivationTimer	ms	---	Same value applies for SCell1 and SCell2. The value infinity is applied.
bwp-InactivityTimer	ms	200	Same value applies for SCell1 and SCell2.
Cell2 timing offset to Cell1	µs	0	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
Cell3 timing offset to Cell1	µs	0	
T1	s	0.2	During T1, DCI-based simultaneous BWP switching of SCell1 and SCell2 is carried out.
T2	s	0.2	During T2 bwp-InactivityTimer timers shall run to expiry.
T3	s	0.2	During T3, timer-based simultaneous BWP switching of SCell1 and SCell2 is carried out.

Table A.7.5.6.3.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1	Cell 2	Cell 3
Frequency Range		FR2		
NR RF channel		1	2	3
Duplex mode		TDD		
TDD configuration		TDDConf.3.1		
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		
Active Downlink BWP ID		0	1, 2	3, 4
Downlink initial BWP Configuration		DLBWP.0.2	DLBWP.0.2	DLBWP.0.2
Uplink initial BWP Configuration		ULBWP.0.2	ULBWP.0.2	ULBWP.0.2
Downlink active BWP-0 Configuration		DLBWP.1.1	---	---
Downlink active BWP-1 Configuration		---	DLBWP.1.1	---
Downlink active BWP-2 Configuration		---	DLBWP.1.3	---
Downlink active BWP-3 Configuration		---	---	DLBWP.1.1
Downlink active BWP-4 Configuration		---	---	DLBWP.1.3
Uplink active BWP-0 Configuration		ULBWP.1.1	ULBWP.1.1	ULBWP.1.1
PDSCH Reference measurement channel		SR.3.1 TDD		
TRS configuration		TRS.2.1 TDD		
TCI state		TCI.State.0		
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters		CCR.3.1 TDD		
OCNG Patterns		OP.1		
SSB Configuration		SSB.3 FR2		
SMTC Configuration		SMTC.1		
EPRE ratio of PSS to SSS	dB	0	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS Note1				
EPRE ratio of OCNG to OCNG DMRS Note1				
Propagation Condition		AWGN	AWGN	AWGN
Correlation Matrix and Antenna Configuration		1x2 Low	1x2 Low	1x2 Low
Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.				

Table A.7.5.6.3.1.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2	Cell 3
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1		
Assumtion for UE beams Note4		Fine	Fine	Fine
Noc Note1	dBm/15kHz	[-111.7]	[-111.7]	[-111.7]
Noc Note1	dBm/SCS	[-102.7]	[-102.7]	[-102.7]
Ês/Noc	dB	[7]	[7]	[7]
SSB-RP Note2	dBm/SCS	[-95.7]	[-95.7]	[-95.7]
Ês/Iot	dB	[7]	[7]	[7]
Io Note3	dBm/95.04 MHz	[-65.9]	[-65.9]	[-65.9]
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 4: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.				

A.7.5.6.3.1.2 Test Requirements

During T1, the UE shall start to send ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after the beginning of DL slot $(m+T_{MultipleBWPswitchDelay}+k1)$.

During T3, the UE shall start to send ACK/NACKs in SCell1 and SCell2 from the first UL slot that occurs after the beginning of DL slot $(n+T_{MultipleBWPswitchDelay}+k1)$.

During T1 and T3, the start of any interruption on PCell due to active BWP switching on SCell1 and SCell2 shall not happen outside the BWP switching delay $T_{MultipleBWPswitchDelay}$, and the length of any interruption shall not exceed the length specified in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed active BWP switch delays in SCell1 and SCell2 to be considered correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.6.4 SCell dormancy switch

A.7.5.6.4.1 NR FR2 PCell SCell dormancy switch of single FR2 SCell inside active time

A.7.5.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Dormant SCell BWP switch delay requirements are within the requirements stated in section 8.6 for UE configured with a single downlink SCell, when the dormancy indication is received in any of the first 3 OFDM symbols or is received after the first 3 OFDM symbols.

The Supported test configurations are given in Table A.7.5.6.4.1.1-1. The test parameters are given in Tables A.7.5.6.4.1.1-2 and cell-specific parameters in A.7.5.6.4.1.1-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A6 is used The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. There are two carriers both in FR2, with one cell on the PCC and 2 cells on SCC. Cell 1, Cell 2 and Cell 3 operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) with configured and activated SCell (SCell1) on radio channel 2 (SCC1). The UE is not aware of Cell 3 on radio channel 2 (SCC1). The UE is reporting CSI and shall not report CQI index 0 (out-of-range) in the available uplink resources to report CQI for the SCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

The UE receives a DCI-based BWP switch command by which the SCell1 (Cell 2) is requested to switch the active BWP to the dormant BWP.

The point in time at which the DCI message is received at the UE antenna connector, in a subframe # denoted n, defines the start of time period T1. The UE shall accomplish the BWP switch to the dormant BWP latest in subframe (n + $T_{BWPswitchDelay}$ + X). The UE shall continue to shall report valid CQI if the UE has available uplink resources to report CQI for the dormant SCell. The UE shall continue to shall report L1-RSRP if the UE has available uplink resources to report L1-RSRP for the Dormant SCell. Any PCell interruption due to BWP switch on the SCell shall occur in the subframes n to (n+ $T_{BWPswitchDelay}$ + X).

Time T2 start at T1 + ($T_{BWPswitchDelay}$ + X). During T2 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell.

Time T3 starts at T2 + 500ms. During T3 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell.

Starting at T4 = T3 + 500ms, Cell 3 becomes detectable. During T3 the UE shall continue to measure and report CQI and L1-RSRP in the available uplink resources to report CQI and L1-RSRP for the SCell. The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T4. The UE is not required to read the neighbour cell SSB index in this test.

At time T5 starting at T4 + 1500ms a a DCI-based BWP switch command by which the SCell1 (Cell 2) is requested to switch the active BWP to the non-dormant BWP.

The point in time at which the DCI message is received at the UE antenna connector, in a subframe # denoted n, defines the start of time period T6. The UE shall accomplish the BWP switch to the non-dormant BWP latest in subframe (n + $T_{BWPswitchDelay}$ + X). The UE shall continue to shall report valid CQI if the UE has available uplink resources to report CQI for the non-dormant SCell. The UE shall continue to shall report L1-RSRP if the UE has available uplink resources to report L1-RSRP for the non-dormant SCell. Any PCell interruption due to BWP switch on the SCell shall occur in the subframes n to (n+ $T_{BWPswitchDelay}$ + X).

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from CQI measurements and RRM measurements, clause 8.2.2.2.12.3, on dormant SCells, shall not exceed [0.5]%.

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from L1-RSRP measurements and RRM measurements, clause 8.2.2.2.12.x, on dormant SCells, shall not exceed [0.5]%.

During T2, T3 and T4 the total rate of ACK/NACK feedback loss on any non-dormant serving cell resulting from RRM measurements and RRM measurements, clause 8.2.2.2.12.3, on dormant SCells, shall not exceed [0.5]%

During T1, T2, T3, T4, T5 and T6, the UE shall be continuously scheduled in the SCell1.

Table A.7.5.6.4.1.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.6.4.1.1-2: General test parameters for dormancy SCell in NR SA with PCell and SCell in FR2

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
PCell		1	Cell 1				
SCell		1	Cell 2				
Neighbour cell		1	Cell 3				Cell to be identified.
RF Channel Number		1	1				cell 1
RF Channel Number		1	2				Cell 2 and Cell 3
Measurement gap type		1					No measurement gaps configured
SSB configuration		1	SSB.1 FR2				for all cells
SMTC configuration		1	SMTC.1				all cells
CSI-RS parameters		1	CSI-RS.3.2 FDD				
CSI reporting periodicity, Non-dormant BWP	ms		2				
CSI reporting periodicity, Dormant BWP	ms		40				
Timing offset between the cells	ms		0				
Triggering DCI format			1_1	0_1	1_1	0_1	Triggering DCI format
OFDM symbol range in slot for transmission of DCI with dormancy indication			0 – 2		3 – 11		Test1 and Test3 are based on that triggering DCI is received within the first three OFDM symbols of a slot. Test2 and Test4 are based on that the triggering DCI is received after the first three OFDM symbols of a slot
A3-Offset	dB	1	-4.5				
CP length		1	Normal				
Hysteresis	dB	1	0				
Time To Trigger	s	1	0				
Filter coefficient		1	0				L3 filtering is not used
DRX		1	OFF				
T1	s	1	5				
T2	s	1	5				

Table A.7.5.6.4.1.1-3: NR Cell specific test parameters for dormancy SCell in NR SA with PCell and SCell in FR2

Parameter	Unit	Test configuration	Cell 1, Cell 2		Cell 3	
			T1	T2	T1	T2
TDD configuration		1	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
Dedicated CORESET RMC configuration, Test 1,2		1	CCR.3.1 TDD		CCR.3.1 TDD	
Dedicated CORESET RMC configuration, Test 3,4			CCR.3.2 TDD		CCR.3.1 TDD	
OCNG Patterns		1	OP.1		OP.1	
TRS configuration		1	TRS.2.1 TDD		N/A	
Downlink initial BWP configuration		1	DLBWP.0.1		N/A	
Uplink initial BWP configuration		1	ULBWP.0.1	N/A	N/A	
Downlink active non-dormant BWP configuration		1	N/A	DLBWP.1.2	N/A	
Downlink active dormant BWP configuration		1	DLBWP.1.2		N/A	
Active UL BWP configuration		1	ULBWP.1.1	N/A	N/A	
RLM-RS		1	CSI-RS		N/A	
EPRE ratio of PSS to SSS	dB		0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS[Note 4]						

EPRE ratio of OCNG to OCNG DMRS Note 4						
N_{oc} Note 2	dBm/SCS	1	-98			
N_{oc} Note 2	dBm/15 kHz	1	-98			
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
Io	dBm/9.36 MHz	1	-64.60	-62.25	--64.60	-62.25
Propagation Condition		1	AWGN			
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols						

A.7.5.6.4.1.2 Test Requirements

During T1 the UE shall switch to the dormant BWP.

During T2, T3, T4 and T5 the UE shall not send ACK/NACK for the PDSCH data scheduled on the SCell.

During T2, T3, T4 and T5 the UE shall continue to send CSI reports for SCell1 with non-zero CQI index.

During T2, T3, T4 and T5 the UE shall continue to send L1-RSRP reports for SCell.

During T4 the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T4.

During T2, T3, T4 and T5, the missing ACK/NACK sent in PCell shall be less than 1.5% of the total number of the expected ACK/NACK.

During T6, the UE shall send ACK/NACK for the PDSCH data scheduled after subframe (n+ $T_{BWPswitchDelay}$ + X) for the SCell1.

All of the above test requirements shall be fulfilled in order for the observed SCell1 BWP switch delays, Pcell interruption rate, correct CSI and L1-RSRP reporting and event triggeres reporting. The rate of correct observed SCell1 hibernation delay, activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

A.7.5.6.4.2 NR FR1 PCell SCell dormancy switch of two FR2 SCells outside active time

A.7.5.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of SCell dormancy switching delay requirements in clause 8.6.2A when the UE is triggered to switch between non-dormancy and dormancy outside DRX active time. In the tested scenario, the UE is connected to PCell in FR1and two SCells in FR2, and the SCells are switched from non-dormancy to dormancy, and vice versa, at a point in time before start of *onDuration*. The UE is configured to monitor PDCCH for DCI format 2_6 at *ps-Offset* before the start of *onDuration*. Two tests are specified, where a UE that only supports triggering within the first three OFDM symbols of a slot shall undergo Test1 only, and a UE that supports triggering also in remaining OFDM symbols of a slot shall undergo both Test1 and Test2. In the tested scenario, *ps-Offset* is selected to correspond to the dormancy switching time specified in clause 8.6.2A.

The supported test configurations are provided in Table A.7.5.6.4.2.1-1 below. General test parameters are provided in Table A.7.5.6.4.2.1-2, and cell-specific parameters are provided in Table A.7.5.6.4.2.1-3 below. OTA-related test parameters are provided in Table A.7.5.6.4.2.1-4.

The tests consist of four consecutive time periods, T1, T2, T3 and T4, respectively.

Three carriers are used in the test. Cell 1 (PCell) is on RF channel 1 (PCC) in FR1, and Cell 2 (SCell1) and Cell 3 (SCell2) are on RF channels 2 (SCC1) and 3 (SCC2) in FR2, respectively. All three cells have constant signal levels throughout the test.

Before the test starts,

- UE is connected to Cell 1 (PCell), Cell 2 (SCell1) and Cell 3 (SCell2).
- UE is configured with a single UE-specific downlink bandwidth part, BWP-0, for Cell 1. BWP-0 includes the bandwidth of the initial DL BWP and SSB.
- UE is configured with one non-dormant and one dormant UE-specific downlink bandwidth part, BWP-0 and BWP-1, respectively, for Cell 2 and Cell 3. BWP-0 includes the bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 1 is BWP-0.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 2 is BWP-0.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP in Cell 3 is BWP-0.
- UE is configured with DRX.
- UE is configured to monitor DCI format 2_6, and to be active during *onDuration* even when no DCI format 2_6 is detected (*ps-WakeUp*).

Time period T1 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from non-dormancy to dormancy. The UE shall switch active bandwidth parts for SCell1 and SCell2, respectively, from non-dormant BWP-0 to dormant BWP-1. The UE shall complete the switching before the start of *onDuration*. The test equipment schedules the UE continuously with new data indications in PCell starting from beginning of *onDuration*. The test equipment verifies that the UE is transmitting HARQ feedback for PCell from the beginning of *onDuration* and thus verifies that the UE has completed interruptions due to dormancy switching before the start of *onDuration.*

Time period T2 starts when T1 is completed. The test equipment continues to schedule the UE continuously in PCell. The UE shall carry out CSI and RRM measurements on the dormant SCells. The UE shall report ACK/NACK in PCell in response to scheduled PDSCH, with the maximum loss of transmitted ACK/NACKs fulfilling the requirement in clause 8.2.2.2.12. The test equipment verifies that the loss of ACK/NACKs is no larger than 1.5%.

Time period T3 starts when T2 is completed. During T3, the test equipment does not schedule the UE, by which the inactivity timer expires and the UE stops monitoring PDCCH except for signalling using DCI format 2_6 at wake-up signalling occasions.

Time period T4 starts when the UE at *ps-Offset* before *onDuration* detects a DCI format 2_6 carrying dormancy indication that indicates that SCell1 and SCell2 are to be switched from dormancy to non-dormancy. The UE shall switch active bandwidth parts for SCell1 and SCell2, respectively, from dormant BWP-1 to non-dormant BWP-0. The UE shall complete the switching before the start of *onDuration*. The test equipment schedules the UE with new data indication in PCell, SCell1 and SCell2 during *onDuration*. The UE shall receive in PCell, SCell1 and SCell2 and send HARQ feedback for PCell, SCell1 and SCell2 via PCell. The test equipment verifies that the UE is transmitting HARQ feedback for PCell, SCell1 and SCell2 from the beginning of *onDuration*, and thus verifies that the UE has completed interruptions due to dormancy switching before the start of *onDuration*.

Table A.7.5.6.4.2.1-1: Supported test configurations

Config	Description
1	PCell: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	PCell: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode SCells: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to undergo test for one of the supported test configurations.	

Table A.7.5.6.4.2.1-2: General test parameters

Parameter	Unit	Value		Comment
		Test1	Test2	
NR RF Channel Number		1, 2, 3		Three NR radio channels are used for this test
Active PCell		Cell 1		PCell on RF channel number 1 in FR1
Active SCell1		Cell 2		SCell1 on RF channel number 2 in FR2
Active SCell2		Cell 3		SCell2 on RF channel number 3 in FR2
CSI reporting periodicity, Non-dormant BWP	ms	2		CSI reporting periodicity for periodic reporting of CQI for PCell and non-dormant SCells
CSI reporting periodicity, Dormant BWP	ms	40		CSI reporting periodicity for periodic reporting of CQI for dormant SCells
CP length		Normal		
DRX		DRX.8		For both PCell and SCells. See clause A.3.3.8.
ps-Offset		Depending on UE capability		Monitoring of DCI 2_6 ahead of start of drx-onDurationTimer. Value of ps-Offset shall correspond to SCell dormancy switching time for switching of two SCells, as specified in clause 8.6.2A. Actual value depends on reported UE capabilities.
ps-WakeUp		true		Wake up for onDuration in case DCI format 2_6 is not detected.
Cell 2 timing offset to Cell 1	μs	<24		Timing offset shall be less than MRTD for FR1-FR2 CA, and leave margin for timing difference between Cell2 and Cell3.
Cell 3 timing offset to Cell 2	ns	<260		Timing offset shall be less than MRTD for FR2 intra-band non-contiguous CA.
OFDM symbol range in slot for transmission of DCI with dormancy indication		0 – 2	3 – 11	Test1 is based on that triggering DCI is received within the first three OFDM symbols of a slot.Test2 is based on that the triggering DCI is received later than within the first three OFDM symbols of a slot.
T1	s	0.2		During this time the SCells are switched from non-dormancy to dormancy.
T2	s	10		During this time the SCells are dormant.
T3	s	0.2		During this time the UE is not scheduled in PCell.
T4	s	0.2		During this time the SCells are switched from dormancy to non-dormancy.

Table A.7.5.6.4.2.1-3: Cell specific test parameters

Parameter		Unit	Cell 1	Cell2	Cell 3
Frequency Range			FR1	FR2	FR2
NR RF channel			1	2	3
Duplex mode	Config 1		FDD	TDD	TDD
	Config 2,3		TDD		
TDD configuration	Config 1		---	TDDConf.3.1	TDDConf.3.1
	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
	Config 3		40: $N_{RB,c}$ = 106		
Downlink initial BWP Configuration			DLBWP.0.2	DLBWP.0.2	DLBWP.0.2
Uplink initial BWP Configuration			ULBWP.0.2	---	---
Downlink active non-dormant BWP-0 Configuration			DLBWP.1.1	DLBWP.1.1	DLBWP.1.1
Downlink active dormant BWP-1 Configuration			---	DLBWP.1.1	DLBWP.1.1
Uplink active BWP-0 Configuration			ULBWP.0.2	---	---
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD	SR.3.1 TDD	SR.3.1 TDD
	Config 2		SR.1.1 TDD		
	Config 3		SR.2.1 TDD		
CSI-RS configuration for CSI reporting, Non-dormant BWP	Config 1		CSI-RS.1.1 FDD	CSI-RS.3.1 TDD	CSI-RS.3.1 TDD
	Config 2		CSI-RS.1.1 TDD		
	Config 3		CSI-RS.2.1 TDD		
CSI-RS configuration for CSI reporting, Dormant BWP			---	CSI-RS.3.5 TDD	CSI-RS.3.5 TDD
TRS configuration	Config 1		TRS.1.1 FDD	TRS.2.1 TDD	TRS.2.1 TDD
	Config 2		TRS.1.1 TDD		
	Config 3		TRS.1.2 TDD		
TCI state			TCI.State.0	TCI.State.0	TCI.State.0
RMSI CORESET parameters	Config 1		CR.1.1 FDD	---	---
	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
Dedicated CORESET parameters, Test 1,2	Config 1		CCR.1.1 FDD	CCR.3.1 TDD	CCR.3.1 TDD
	Config 2		CCR.1.1 TDD		
	Config 3		CCR.2.1 TDD		
Dedicated CORESET parameters, Test 3,4	Config 1		CCR.1.5 FDD	CCR.3.1 TDD	CCR.3.1 TDD
	Config 2		CCR.1.5 TDD		
	Config 3		CCR.2.3 TDD		
OCNG Patterns			OP.1	OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2	SSB.1 FR2
	Config 3		SSB.2 FR1		
SMTC Configuration			SMTC.1	SMTC.1	SMTC.1
Correlation Matrix and Antenna Configuration			1x2 Low		
EPRE ratio of PSS to SSS		dB	0	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS[Note1]					
EPRE ratio of OCNG to OCNG DMRS[Note1]					

Propagation Condition		N/A Link only, see clause A.3.7A	AWGN	AWGN
Note 1: OCNG shall be used such that the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.				

Table A.7.5.6.4.2.1: OTA related test parameters

Parameter	Unit	Cell 1	Cell 2	Cell 3
Angle of arrival configuration		N/A Link only, see clause A.3.7A	Setup 1 defined in clause A.3.15.1	
Assumtion for UE beams Note6			Fine	Fine
N_{oc} Note1	dBm/15kHz		-112	-112
N_{oc} Note1	dBm/SCS		-103	-103
SS-RSRP Note2	dBm/SCS Note3		-85	-85
Ês/Iot	dB		18	18
Io Note4	dBm/95.04 MHz Note4		-56	-56
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.				

A.7.5.6.4.2.2 Test Requirements

Starting from *onDuration* in time period T1, the UE shall transmit ACK/NACK in response to scheduling in PCell. There shall be no loss of ACK/NACK.

During time period T2, the UE shall transmit ACK/NACKs in response to scheduling in PCell and the rate of missed ACK/NACKs shall be no more than 1.5%.

Starting from *onDuration* in time period T4, the UE shall transmit ACK/NACK in response to scheduling in PCell, SCell1 and SCell2. There shall be no loss of ACK/NACK.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.6.5 Simultaneous RRC-based Active BWP Switch on multiple CCs

A.7.5.6.5.1 Active BWP switch on multiple SCells with non-DRX in SA

A.7.5.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for simultaneous RRC-based BWP switch on multiple CCs defined in clause 8.6.3A.

The supported test configurations are shown in Table A.7.5.6.5.1.1-1. The test scenario comprises one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.5.1.1-2. NR cell-specific parameters are provided in Table A.7.5.6.5.1.1-3, and OTA related test parameters in Table A.7.5.6.5.1.1-4.

PDCCHs indicating new transmissions shall be transmitted in PCell and SCell throughout to ensure that UE sends ACK/NACKs for PDSCH reception in PCell, SCell.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), to Cell 2 (SCell) on radio channel 2 (SCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell1 (PCell), Cell 2 (SCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition on Cell1 (PCell), Cell 2 (SCell).

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration in Cell1 and Cell2, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition in Cell1 and Cell2.

The UE shall be able to receive PDSCH on Cell 1 and Cell 2 at the beginning of the DL slot right after PCell's DL slot ($i+\frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length}$) as defined in clause 8.6.3A and be ready for the reception of uplink grant for the PCell no later than at the beginning of the DL slot right after slot ($i+\frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length}$). The UE shall be continuously scheduled on Cell 1's BWP-1and Cell 2's BWP-1 starting from the beginning of the DL slot right after slot ($i+\frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length}$).

$T_{RRCprocessingDelay}$, $T_{BWPswitchDelayRRC}$ and D_{RRC} are defined in clause 8.6.3A.

The test equipment verifies the DL BWP switch time in Cell 1 and Cell 2 by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.5.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode

Table A.7.5.6.5.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2, 3	Three NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell2 timing offset to Cell1	μs	0	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	[0.2]	During T1, RRC-based simultaneous BWP switching of PCell and SCell is carried out.

Table A.7.5.6.5.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1	Cell 2
Frequency Range			FR2	
NR RF channel			1	2
Duplex mode			TDD	
TDD configuration			TDDConf.3.1	
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66	
Active Downlink BWP ID			0	1
Downlink initial BWP Configuration			DLBWP.0.2	DLBWP.0.2
Uplink initial BWP Configuration			ULBWP.0.2	ULBWP.0.2
Initial Condition	Active DL BWP-1 Configuration		DLBWP.1.3	DLBWP.1.3
	Active UL BWP-1 Configuration		ULBWP.1.3	ULBWP.1.3
Final Condition	Active DL BWP-1 Configuration		DLBWP.1.1	DLBWP.1.1
	Active UL BWP-1 Configuration		ULBWP.1.1	ULBWP.1.1
PDSCH Reference measurement channel			SR.3.1 TDD	
TRS configuration			TRS.2.1 TDD	
TCI state			TCI.State.0	
RMSI CORESET parameters			CR.3.1 TDD	
Dedicated CORESET parameters			CCR.3.1 TDD	
OCNG Patterns			OP.1	
SSB Configuration			SSB.3 FR2	
SMTC Configuration			SMTC.1	
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS Note1				
EPRE ratio of OCNG to OCNG DMRS Note1				
Propagation Condition			AWGN	AWGN
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.7.5.6.3.1.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1	
Assumtion for UE beams Note4		Fine	Fine
Noc Note1	dBm/15kHz	[-111.7]	[-111.7]
Noc Note1	dBm/SCS	[-102.7]	[-102.7]
Ês/Noc	dB	[7]	[7]
SSB-RP Note2	dBm/SCS	[-85]	[-85]
Ês/Iot	dB	[18]	[18]
Io Note3	dBm/95.04 MHz	[-56]	[-56]
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SSB-RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Equivalent power received by an antenna with 0 dBi gain at the center of the quiet zone Note 4: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.			

A.7.5.6.5.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell and SCell in the beginning of the DL slot right after slot ($i+\frac{T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}+D_{RRC}}{NR\ slot\ length}$).

All of the above test requirements shall be fulfilled in order for the observed PCell and SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7 PSCell addition and release delay

A.7.5.7.1 Addition and Release Delay of known NR PSCell

A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3 and A.7.5.7.1.1-4 below. The test consists of five time periods with durations T1, T2, T3, T4 and T5, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the UE shall identify Cell 2 and send an event-triggered report. When the tests system receives the report, it shall send updated measurement control information where the measurement gap pattern is released. Before the start of T3, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T3.

During T3, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T4.

During T4, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T5.

During T5, the UE shall release the PSCell.

Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell

Config	Description
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay

Parameter		Unit	Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test
Active PCell			Cell 1	PCell on RF channel number 1 in FR1
Neighbour cell			Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2
A4	Hysteresis	dB	0	Hysteresis for event A4
	Threshold RSRP	dBm	-118	Threshold for event A4
	Time to Trigger	S	0	Time to trigger for event A4
DRX			OFF	For both PCell and PSCell once activated
Measurement gap pattern ID			0	Gaps are configured before T2 and released before T3.
PRACH configuration in Cell 2			FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.
CSI reporting periodicity and offset configuration for Cell 2		ms	2	
T1		s	5	During this time the PCell is known and Cell 2 is unknown.
T2		s	1	During this time the UE shall identify neighbour cell 2 and report event B1.
T3		s	1	During this time the UE adds the PSCell.
T4		s	1	During this time the UE sends CSI reports for PSCell.
T5		s	1	During this time the UE releases the PSCell.

Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2				
				T1	T2	T3	T4	T5
Frequency Range		1,2,3	FR1	FR2				
Duplex mode		1	FDD	TDD				
		2,3	TDD					
TDD configuration		1	–	TDDConf.3.1				
		2	TDDConf.1.1					
		3	TDDConf.2.1					
$BW_{channel}$	MHz	1,2	10: $N_{RB,c}$ = 52	100: $N_{RB,c}$ = 66				
		3	40: $N_{RB,c}$ = 106					
Data RBs allocated		1,2	52	48				
		3	106					
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1	DLBWP.0.1				
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1	ULBWP.0.1				
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1	DLBWP.1.1				
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1	ULBWP.1.1				
PDSCH Reference Measurement Channel		1	SR.1.1 FDD	SR.3.3 TDD				
		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
TRS configuration		1,2,3	–	TRS.2.1 TDD				
TCI state		1,2,3	–	TCI.State.0				
RMSI CORESET parameters		1	CR.1.1 FDD	CR.3.2 TDD				
		2	CR.1.1 TDD					
		3	CR.2.1 TDD					
Dedicated CORESET parameters		1	CCR.1.1 FDD	CCR.3.7 TDD				
		2	CCR.1.1 TDD					
		3	CCR.2.1 TDD					
OCNG Patterns[Note1]		1,2,3	OP.1	OP.3				
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2				
		3	SSB.2 FR1					
SMTC configuration		1,2,3	SMTC.2	SMTC.1				
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120				
		3	30					
EPRE ratio of PSS to SSS	dB	1,2,3	0	0				
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS								
EPRE ratio of OCNG to OCNG DMRS								
Propagation Condition		1,2,3	N/A	AWGN				

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Void
Note 4: Void
Note 5: Void

Table A.7.5.7.1.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell 2				
				T1	T2	T3	T4	T5
Angle of arrival configuration		1,2,3	Link only, see clause A.3.7A	Setup 2a according to clause A.3.15.2.1				
Assumption for UE beams Note 3				Rough				
Ês	dBm/SCS	1,2,3		-∞	-81			
SSB_RP Note1, Note2	dBm/SCS	1,2,3		-∞	-81			
$\hat{E}_s/I_{ot\ BB}$ Note1, Note 4	dB	1,2,3		-∞	4.88			
Io Note 1, Note2	dBm/95.04 MHz	1,2,3		N/A	-56.41			

Note 1: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 112 ms into T3.

The UE shall transmit at least one periodic CSI report for PSCell during T4.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7.2 Addition and Release Delay of unknown NR PSCell

A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3 and A.7.5.7.2.1-4 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell

Config	Description
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1 in FR1
Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2
DRX		OFF	For both PCell and PSCell once activated
PRACH configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.
CSI reporting periodicity and offset configuration for Cell 2	ms	[2]	
T1	s	5	During this time the PCell is known and Cell 2 is unknown.
T2	s	1	During this time the UE adds the PSCell.
T3	s	1	During this time the UE sends CSI reports for PSCell.
T4	s	1	During this time the UE releases the PSCell.

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2			
				T1	T2	T3	T4
Frequency Range		1,2,3	FR1	FR2			
Duplex mode		1	FDD	TDD			
		2,3	TDD				
TDD configuration		1	–	TDDConf.3.1			
		2	TDDConf.1.1				
		3	TDDConf.2.1				
$BW_{channel}$	MHz	1,2	10: $N_{RB,c}$ = 52	100: $N_{RB,c}$ = 66			
		3	40: $N_{RB,c}$ = 106				
Data RBs allocated		1,2	52	48			
		3	106				
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1	DLBWP.0.1			
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1	ULBWP.0.1			
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1	DLBWP.1.1			
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1	ULBWP.1.1			
PDSCH Reference Measurement Channel		1	SR.1.1 FDD	SR.3.3 TDD			
		2	SR.1.1 TDD				
		3	SR.2.1 TDD				
TRS configuration		1,2,3	–	TRS.2.1 TDD			
TCI state		1,2,3	–	TCI.State.0			
RMSI CORESET parameters		1	CR.1.1 FDD	CR.3.2 TDD			
		2	CR.1.1 TDD				
		3	CR.2.1 TDD				
Dedicated CORESET parameters		1	CCR.1.1 FDD	CCR.3.7 TDD			
		2	CCR.1.1 TDD				
		3	CCR.2.1 TDD				
OCNG Patterns[Note1]		1,2,3	OP.1	OP.3			
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2			
		3	SSB.2 FR1				
SMTC configuration		1,2,3	SMTC.2	SMTC.1			
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120			
		3	30				
EPRE ratio of PSS to SSS	dB	1,2,3	0	0			
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS							
EPRE ratio of OCNG to OCNG DMRS							
Propagation Condition		1,2,3	AWGN	AWGN			
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void Note 5: Void							

Table A.7.5.7.2.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell 2			
				T1	T2	T3	T4
Angle of arrival configuration		1,2,3	Link only, see clause A.3.7A	Setup 2a according to clause A.3.15.2.1			
Assumption for UE beams Note 3				Rough			
Ês	dBm/SCS	1,2,3		-∞	-81		
SSB_RP Note1, Note 2	dBm/SCS	1,2,3		-∞	-81		
$\hat{E}_s/I_{ot\ BB}$ Note1, Note 4	dB	1,2,3		-∞	4.88		
Io Note 1, Note 2	dBm/95.04 MHz	1,2,3		N/A	-56.41		

Note 1: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 572 ms into T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.8 Active TCI state switch delay

A.7.5.8.1 MAC-CE based active TCI state switch

A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL’d to SSB0) and TCIstate 1 (QCL’d to SSB1), in Cell 1 before starting the test.

- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ T_{HARQ} +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + ($T_{first\text{-}SSB}$ + $T_{SSB\text{-}proc}$).

Table A.7.5.8.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	s	0.2	
T2	s	0.2	

Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
$BW_{channel}$		100 MHz: $N_{RB,c}$ = 66
Data RBs allocated		66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3. 2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP. 5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TCI.State.0
TCI State 1		TCI.State.1
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna Configuration		1x2 Low
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note 1)		
Propagation Condition		AWGN
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.		

Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit	Cell 1			
		SSB0		SSB1	
		T1	T2	T1	T2
Angle of arrival configuration		Setup 3 according to clause A.3.15.3			
		AoA1		AoA2	
Assumption for UE beams Note 6		Rough			
$\hat{E}_s$	dBm/SCS	-80.6	-80.6	-Infinity	-80.6
SS B_RP Note 2	dBm/ SCS	-80.6	-80.6	-Infinity	-80.6
$\hat{E}_s/I_{ot}$ BB Note 7	dB	8.3	8.3	-Infinity	8.3
Io Note2	dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0
Note 1: Void Note 2: SS B_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the center of the quiet zone. Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. Note 7: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.					

A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till n+ T_{HARQ} +3 ms
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + $T_{first\text{-}SSB}$

A.7.5.8.2 RRC based active TCI state switch

A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ $T_{RRC\_processing}$ + $T_{first\text{-}SSB}$ + 2ms.

Table A.7.5.8.2.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	s	0.2	
T2	s	2	

Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
$BW_{channel}$		100 MHz: $N_{RB,c}$ = 66
Data RBs allocated		66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3. 2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP. 5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.0
TCI State 1		TCI.State.1
reportConfigType		ssb-Index-RSRP
reportConfigType		periodic
Number of reported RS		2
L1-RSRP reporting period	slot	640
timeRestrictionForChannelMeasurements		configured
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna Configuration		1x2 Low
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note 1)		
Propagation Condition		AWGN
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.		

Table A.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit	Cell 1			
		SSB0		SSB1	
		T1	T2	T1	T2
Angle of arrival configuration		Setup 3 according to clause A.3.15.3			
		AoA1		AoA2	
Assumption for UE beams Note 6		Rough			
$\hat{E}_s$	dBm/SCS	-80.6	-80.6	-Infinity	-80.6
SS B_RP Note 2	dBm/ SCS	-80.6	-80.6	-Infinity	-80.6
$\hat{E}_s/I_{ot}$ BB Note 7	dB	8.3	8.3	-Infinity	8.3
Io Note2	dBm/95.04 MHz Note4	-6.0	-56.0	- Infinity	-56.0
Note 1: Void Note 2: SS B_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the center of the quiet zone. Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. Note 7: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.					

A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC\_processing}$ + $T_{first\text{-}SSB}$ + 2ms.

A.7.5.9 Uplink spatial relation switch delay

A.7.5.9.1 MAC-CE based Spatial Relation switch

A.7.5.9.1.1 NR PCell FR2 spatial relation associated with known DL-RS

A.7.5.9.1.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of the uplink spatial relation switch delay requirement defined in clause 8.12.3 by a UE capable of beam correspondence without the need for UL beam sweeping. The supported test configurations are shown in Table A.7.5.9.1.1.1-1.

The test scenario comprises one PCell (Cell 1) as outlined in Table A.7.5.9.1.1.1-2. Cell-specific parameters are provided in Table A.7.5.9.1.1.1-3. OTA-related test parameters are provided in Table A.7.5.9.1.1.1-4.

Throughout the test, PDCCH indicating new transmissions shall ge sent continuously on PCell to ensure that the UE will send ACK/NACKs on PUCCH.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.

- UE is configured with a single TCI state, TCI State-0, which is QCLed with SSB0.
- UE is configured with two spatial relation information configurations Spatial Relation Info-0 and Spatial Relation Info-1 for PUCCH, each associated with SSB0 and SSB1, respectively.
- UE is indicated via MAC-CE activation of *PUCCH-SpatialRelationInfoId* corresponding to Spatial Relation Info-0
- UE is configured with a CSI measurement configuration indicating L1-RSRP measurements on SSB0 and SSB1 with periodic reporting. The L1-RSRP measurement period is influenced by the following: the higher layer parameter *timeRestrictionForChannelMeasurement* is configured, measured SSBs are fully overlapping with SMTC window, and there are no conflicts with measurement gaps.

The test consists of two time periods, T1 and T2. During T1 only the SSB associated with PDCCH TCI state-0 and PUCCH Spatial Relation Info-0 is transmitted. At the beginning of T2, transmission of the SSB associated with PUCCH Spatial Relation Info-1 starts. The UE conducts periodic L1-RSRP measurements and *SSB-Index-RSRP* reporting for SSB0 and SSB1. In slot n, which is within 1280ms after UE receiving both SSB0 and SSB1, and after reporting valid results for both the SSB0 and the SSB1, the UE receives a MAC-CE indicating a switch of spatial relation to PUCCH Spatial Relation Info 1.

The test equipment verifies that the UE transmits according to PUCCH Spatial Relation Info 0 up until slot n + T_{HARQ}/NR slot length + $3N_{slot}^{subframe,\mu}$, and according to PUCCH Spatial Relation Info 1 from slot n + T_{HARQ}/NR slot length + $3N_{slot}^{subframe,\mu}$ + 1 and onwards.

Table A.7.5.9.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.9.1.1.1-2: General test parameters

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
L1-RSRP reporting period	slot	160	Periodic L1-RSRP reporting configured
L1-RSRP measured RS		SSB0, SSB1	L1-RSRP measurements of SSB0 and SSB1.
Number of reported RS		2	L1-RSRP reporting of measurements on SSB0 and SSB1.
T1	s	[0.2]	
T2	s	[2]	

Table A.7.5.9.1.1.1-3: NR Cell specific test parameters

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
$BW_{channel}$		100 MHz: $N_{RB,c}$ = 66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State-0 Configuration		TCI.State.0
reportConfigType		ssb-Index-RSRP
reportConfigType		periodic
timeRestrictionForChannelMeasurements		configured
TRS Configuration		TRS.2.1 TDD
Spatial Relation Info-0 Configuration		PUCCH.SRI.0
Spatial Relation Info-1 Configuration		PUCCH.SRI.1
Correlation Matrix and Antenna Configuration		1x2 Low
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS[Note 1]		
EPRE ratio of OCNG to OCNG DMRS[Note 1]		
Propagation Condition		AWGN
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.		

Table A.7.5.9.1.1.1-4: OTA related test parameters

Parameter	Unit	Cell 1			
		SSB0		SSB1	
		T1	T2	T1	T2
Angle of arrival configuration		Setup 3 according to clause A.3.15.3			
		AoA1		AoA2	
Assumption for UE beams Note 6		Rough			
N_{oc} Note 1	dBm/15 kHz	-92.1			
N_{oc} Note 1	dBm/SCS	-83.1			
$\hat{E}_s/N_{oc}$	dB	1		-infinity	1
SS-RSRP Note 2	dBm/120 kHz Note3	-82.1		-infinity	-82.1
Io Note2	dBm/95.04 MHz Note4	-50.6		-54.1	-50.6
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the center of the quiet zone. Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.					

A.7.5.9.1.1.2 Test Requirements

During T2, the UE shall send L1-RSRP report with results for SSB0 and SSB1.

After receiving MAC-CE command in slot *n*, the UE shall:

- Continue transmitting using PUCCH spatial relation associated with SSB0 up to and including slot *n* + T_{HARQ}/NR slot length + $3N_{slot}^{subframe,\mu}$
- Start transmitting using PUCCH spatial relation associated with SSB1 from slot *n* + T_{HARQ}/NR slot length + $3N_{slot}^{subframe,\mu}$ + 1 and onwards.

The rate of correct events observed during repeated tests shall be at least [90]%.

A.7.5.9.2 RRC based spatial relation switch

A.7.5.9.2.1 NR PCell FR2 spatial relation switch associated with a known DL-RS

A.7.5.9.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the RRC based spatial relation switch delay requirement defined in clause 8.12.5 by a UE capable of beam correspondence without the need for UL beam sweeping. In the test the higher layer parameter *timeRestrictionForChannelMeasurements* is configured. Supported test configuration is shown in Table A.7.5.9.2.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.9.2.1.1-2. Cell-specific parameters of PCell is specified in Table A.7.5.9.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.9.2.1.1-4.

Periodic SRS is transmitted on PCell (Cell 1), and the SRS configuration is SRSConf.1 given in Table A.5.4.1.1.1-3.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 1 SRS-SpatialRelation0 associated with SSB0.
- UE is indicated SRS-SpatialRelation0 as the active SRS spatial relation.

The test consists of two time periods, T1 and T2. During T1 only SSB0 to which SRS-SpatialRelation0 associated is transmitted. UE shall transmit periodic SRS with SRS-SpatialRelation0 on the UL of the PCell.

T2 start when the tester initiates transmission of SSB1 corresponding to SRS-SpatialRelation1. The UE is configured to transmit periodic L1-RSRP reports.

In slot n, which is within [1280]ms of UE providing the L1-RSRP report with results for both SSB0 and SSB1, the UE receives an RRC command indicating a switch to transmit periodic SRS with target SRS-SpatialRelation1. The UE shall be able to transmit periodic SRS with target spatial relation (SRS-SpatialRelation1) on PCell in slot n + $T_{RRC\_processing}$/NR slot length +1.

Table A.7.5.9.2.1.1-1: Supported test configurations

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.9.2.1.1-2: General test parameters for spatial relation switch associated with a known DL-RS

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
timeRestrictionForChannelMeasurements		configured	Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1)
T1	s	0.5	
T2	s	1.5	

Table A.7.5.9.2.1.1-3: NR Cell specific test parameters for spatial relation switch associated with a known DL-RS

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
$BW_{channel}$		100 MHz: $N_{RB,c}$ = 66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
SRS-SpatialRelation0		SRS.SRI0
SRS-SpatialRelation1		SRS.SRI1
reportConfigType		ssb-Index-RSRP
reportConfigType		periodic
Number of reported RS		2
L1-RSRP reporting period	slot	160
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna Configuration		1x2 Low
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS (Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note 1)		
Propagation Condition		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.		

Table A.7.5.9.2.1.1-4: OTA related test parameters for spatial relation switch associated with a known DL-RS

Parameter	Unit	Cell 1			
		SSB0		SSB1	
		T1	T2	T1	T2
Angle of arrival configuration		Setup 3 according to clause A.3.15.3			
		AoA1		AoA2	
Assumption for UE beams Note 6		Rough		Rough	
N_{oc} Note 1	dBm/15 kHz	-92.1			
N_{oc} Note 1	dBm/SCS	-83.1			
$\hat{E}_s/N_{oc}$	dB	1	1	-Infinity	1
SS-RSRP Note 2	dBm/120 kHz Note3	-82.1	-82.1	-Infinity	-82.1
Io Note2,Note6	dBm/95.04 MHz Note4	-50.6	-50.6	-54.1	-50.6
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the center of the quiet zone. Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.5.9.2.1.2 Test Requirements

During T1 UE shall send L1-RSRP report with SSB0 to which SRS-SpatialRelation0 is associated. During T2, UE shall send L1-RSRP report with SSB1 to which SRS-SpatialRelation1 is associated.

After receiving RRC command in slot n, UE shall be able to transmit target periodic SRS with SRS-SpatialRelation1 on the PCell in the slot n + $T_{RRC\_processing}$/*NR slot length* + 1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.10 UE specific CBW change

A.7.5.10.1 NR FR2 UE specific CBW change of PCell with non-DRX in SA

A.7.5.10.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13. Supported test configurations are shown in Table A.7.5.10.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.10.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.10.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK transmission.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).

- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in PCell.
- UE has been configured with UE-specific CBW (CBW-1)
- UE is indicated in SCS-SpecificCarrier [2] that the UE-specific CBW is CBW-1 as the initial condition in Cell 1 (PCell).

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated CBW configuration, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its CBW with the updated CBW of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}} + T_{\mathrm{CBWchangeDelayRRC}}}{\mathrm{NR\ Slot\ length}}$ as defined in clause 8.13.2 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}} + T_{\mathrm{CBWchangeDelayRRC}}}{\mathrm{NR\ Slot\ length}} + \mathrm{k1}$. The UE shall be continuously scheduled on PCell's new CBW starting from the first DL slot that occurs after the beginning of DL slot $\mathrm{i} + \frac{T_{\mathrm{RRCprocessingDelay}} + T_{\mathrm{CBWchangeDelayRRC}}}{\mathrm{NR\ Slot\ length}}$.

$T_{RRCprocessingDelay}$ and $T_{CBWchangeDelayRRC}$ are defined in clause 8.13.

The test equipment verifies the UE specific CBW switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated CBW configurations sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.10.1.1-1: UE specific CBW change supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.7.5.10.1.1-2: General test parameters for UE specific CBW change in NR SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	s	[0.2]	

Table A.7.5.10.1.1-3: NR Cell specific test parameters for UE specific CBW change in NR SA

Parameter		Unit	Cell 1
Frequency Range			FR2
Duplex mode			TDD
TDD configuration			TDDConf.3.1
$BW_{channel}$			100 MHz: $N_{RB,c}$ = 66
Active DL BWP ID			1
Initial DL BWP Configuration (BWP-1)			DLBWP.0.2
Initial UL BWP Configuration			ULBWP.0.2
Initial Condition	Active DL CBW-1 Configuration		DLCBW.1.1
	Active UL CBW-1 Configuration		ULCBW.1.1
Final Condition	Active DL CBW-1 Configuration		DLCBW.1.2
	Active UL CBW-1 Configuration		ULCBW.1.2
'PDSCH Reference measurement channel			SR.3.1 TDD
RMSI CORESET parameters			CR.3.1 TDD
Dedicated CORESET parameters			CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration			SMTC.1
TCI State			TCI.State.0
TRS Configuration			TRS.2.1 TDD
Antenna Configuration			1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.7.5.10.1.1-4: OTA related test parameters for UE specific CBW change test case

Parameter		Unit	Cell 2
Angle of arrival configuration			Setup 1 according to table A.3.15
Assumption for UE beams Note 5			Fine
N_{oc} Note1	NR_TDD_FR2_A	dBm/15kHz	-112
	NR_TDD_FR2_B		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
N_{oc} Note1	NR_TDD_FR2_A	dBm/SCS	-103
	NR_TDD_FR2_B		

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<tr><td>NR_TDD_FR2_Y</td></tr>
<tr><td rowspan="6">SS-RSRP Note2</td><td>NR_TDD_FR2_A</td><td rowspan="6">dBm/SCS Note3</td><td rowspan="6">-85</td></tr>
<tr><td>NR_TDD_FR2_B</td></tr>
<tr><td>NR_TDD_FR2_F</td></tr>
<tr><td>NR_TDD_FR2_G</td></tr>
<tr><td>NR_TDD_FR2_T</td></tr>
<tr><td>NR_TDD_FR2_Y</td></tr>
<tr><td colspan="2">$\hat{E}_s/I_{ot}$</td><td>dB</td><td>18</td></tr>
<tr><td rowspan="6">Io Note2</td><td>NR_TDD_FR2_A</td><td rowspan="6">dBm/95.04 MHz Note4</td><td rowspan="6">-56</td></tr>
<tr><td>NR_TDD_FR2_B</td></tr>
<tr><td>NR_TDD_FR2_F</td></tr>
<tr><td>NR_TDD_FR2_G</td></tr>
<tr><td>NR_TDD_FR2_T</td></tr>
<tr><td>NR_TDD_FR2_Y</td></tr>
<tr><td colspan="4">Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.</td></tr>
</table>

A.7.5.10.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot $i + \frac{T_{\text{RRCprocessingDelay}} + T_{\text{CBWchangeDelayRRC}}}{\text{NR Slot length}}$ and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{\text{RRCprocessingDelay}} + T_{\text{CBWchangeDelayRRC}}}{\text{NR Slot length}} + \text{k1}$.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PCell UE specific CBW change delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6 Measurement procedure

A.7.6.1 Intra-frequency Measurements

A.7.6.1.1 SA event triggered reporting test without gap under non-DRX

A.7.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.1.1-1.

Table A.7.6.1.1.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.1.1-2, A.7.6.1.1.1-3 and A.7.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1	
offsetMO	dB	1, 2	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	s	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	s	1, 2	5	
T2	s	1, 2	5	

Table A.7.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1, 2	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		1	24		24	
		2	48		48	
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2	SSB		SSB	
PDSCH RMC configuration		1	SR.3.2 TDD		N/A	
		2	SR.3.3 TDD			
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
		2	CR.3.2 TDD		CR.3.2 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
		2	CCR.3.7 TDD		CCR.3.7 TDD	
TRS configuration		1, 2	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI states		1, 2	TCI.State.2		N/A	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120		120	
OCNG Patterns		1, 2	OP.5		N/A	
SSB		1	SSB.1 FR2		SSB.7 FR2	
		2	SSB.2 FR2		SSB.8 FR2	
Propagation Condition		1, 2	AWGN		AWGN	

Table A.7.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Setup 3 defined in A.3.15.3			
			AoA1		AoA2	
Beam assumption Note 4		1,2	Rough		Rough	
E_s	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
$\hat{E}_s/I_{ot}$ BB Note 5	dB	1, 2	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1	-64.41	-64.41	See Cell 1 columns	
		2	-61.41	-61.41		
Time multiplexing of the downlink transmissions from each AoA		1, 2	Defined in Figure A.7.6.1.1.1-1			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Void
Note 3: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

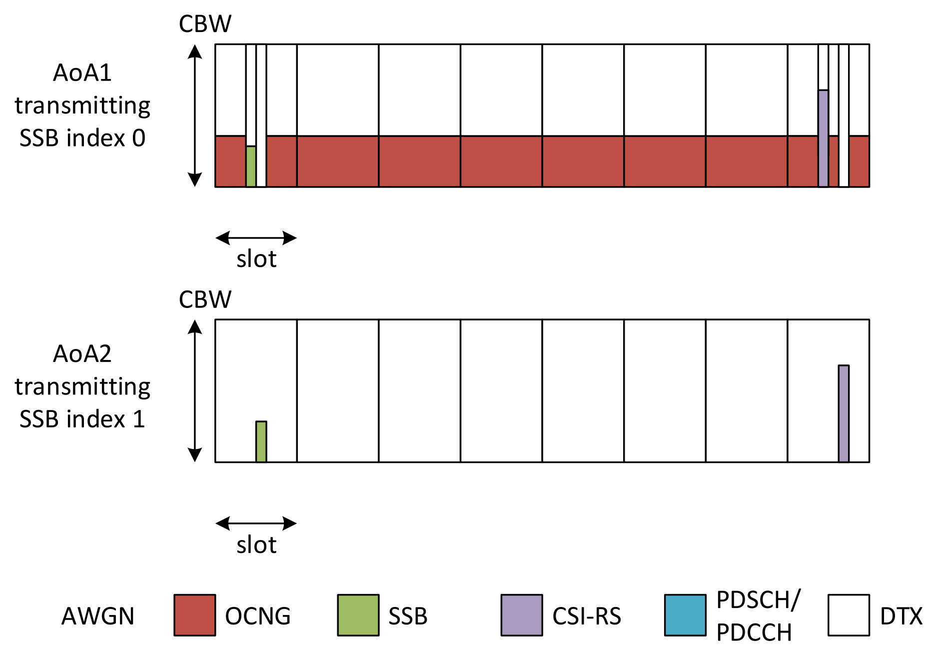

Figure A.7.6.1.1.1-1: Time multiplexed downlink transmissions (Config 1 example)

A.7.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.2 SA event triggered reporting test without gap under DRX

A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.2.1-2 ~ 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	
Active cell		1, 2	PCell (Cell 1)		
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2		One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1		
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	s	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	s	1, 2	5		
T2	s	1, 2	10	52	

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1, 2	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		1, 2	66		66	
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2	SSB		SSB	
PDSCH RMC configuration		1	SR.3.2 TDD		N/A	
		2	SR.3.3 TDD			
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
		2	CR.3.2 TDD		CR.3.2 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
		2	CCR.3.7 TDD		CCR.3.7 TDD	
TRS configuration		1, 2	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI states		1, 2	TCI.State.2		N/A	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120		120	
OCNG Patterns		1, 2	OP.1		OP.1	
SSB		1	SSB.3 FR2		SSB.3 FR2	
		2	SSB.4 FR2		SSB.4 FR2	
Propagation Condition		1, 2	AWGN		AWGN	

Table A.7.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1,2	Rough		Rough	
$\hat{E}_s/I_{ot}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52
N_{oc} Note 2	dBm/15 KHz	1, 2	-98			
N_{oc} Note 2	dBm/SCS	1	-89			
		2	-86			
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85
		2	-82	-82	-Infinity	-82
$\hat{E}_s/N_{oc}$	dB	1, 2	4	4	-Infinity	4
Io	dBm/95.04MHz	1, 2	-54.53	-52.18	See Cell 1 columns	
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.						

Table A.7.6.1.2.1-5: Void

Table A.7.6.1.2.1-6: Void

A.7.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

A.7.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.3.1-1.

Table A.7.6.1.3.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.3.1-2 ~ 4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2	40	
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SMTC configuration		1, 2	SMTC.1	
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD	
offsetMO	dB	1, 2	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	s	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	s	1, 2	5	
T2	s	1, 2	5	

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1, 2	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		1	24		24	
		2	48		48	
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBWP.1.2		ULBWP.1.1	
RLM-RS		1, 2	CSI-RS		SSB	
PDSCH RMC configuration		1	SR.3.2 TDD		N/A	
		2	SR.3.3 TDD			
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
		2	CR.3.2 TDD		CR.3.2 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
		2	CCR.3.7 TDD		CCR.3.7 TDD	
TRS configuration		1, 2	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI states		1, 2	TCI.State.2		N/A	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120		120	
OCNG Patterns		1, 2	OP.5		N/A	
SSB		1	SSB.3 FR2		SSB.7 FR2	
		2	SSB.4 FR2		SSB.8 FR2	
Propagation Condition		1, 2	AWGN		AWGN	

Table A.7.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Setup 3 defined in A.3.15.3			
			AoA1		AoA2	
Beam Assumption Note 4		1,2	Rough		Rough	
E_s	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
$\hat{E}_s/I_{ot}$ BB Note 5	dB	1, 2	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1	-64.41	-64.41	See Cell 2 columns	
		2	-64.41	-64.41		
Time multiplexing of the downlink transmissions from each AoA		1	Defined in Figure A.7.6.1.3.1-1			
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.						
Note 2: Void						
Note 3: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						
Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.						

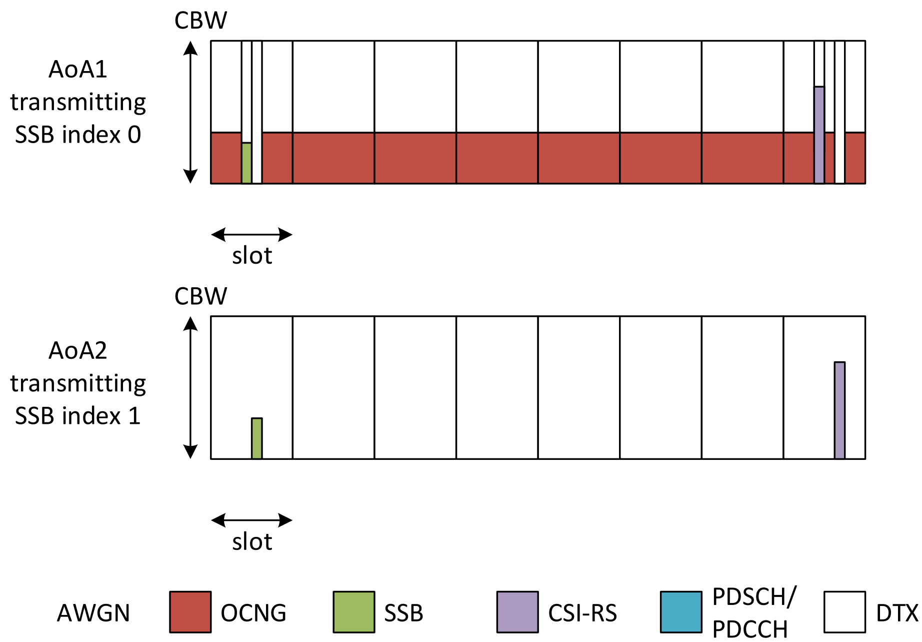

Figure A.7.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

A.7.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

A.7.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.4.1-1.

Table A.7.6.1.4.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	
Active cell		1, 2	PCell (Cell 1)		
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2		One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2	40		
Measurement gap length	ms	1, 2	6		
Measurement gap offset	ms	1, 2	39		
SMTC configuration		1, 2	SMTC.1		
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD		
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	s	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	s	1, 2	5		
T2	s	1, 2	10	52	

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1, 2	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		1, 2	66		66	
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBWP.1.2		ULBWP.1.1	
RLM-RS		1, 2	SCSI-RS		SSB	
PDSCH RMC configuration		1	SR.3.2 TDD		N/A	
		2	SR.3.3 TDD			
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
		2	CR.3.2 TDD		CR.3.2 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
		2	CCR.3.7 TDD		CCR.3.7 TDD	
TRS configuration		1, 2	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI state		1, 2	TCI.State.2		N/A	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120		120	
OCNG Patterns		1, 2	OP.1		OP.1	
SSB		1	SSB.3 FR2		SSB.3 FR2	
		2	SSB.4 FR2		SSB.4 FR2	
Propagation Condition		1, 2	AWGN		AWGN	

Table A.7.6.1.4.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Setup 1 defined in A.3.15.1			
Beam Assumption Note 4		1,2	Rough			
$\hat{E}_s/I_{ot}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52
N_{oc} Note 2	dBm/15 KHz	1, 2	-98			
N_{oc} Note 2	dBm/SCS	1	-89			
		2	-86			
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85
		2	-82	-82	-Infinity	-82
$\hat{E}_s/N_{oc}$	dB	1, 2	4	4	-Infinity	4
Io	dBm/95.04MHz	1,2	-54.53	-52.18	See Cell 1 columns	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

Table A.7.6.1.4.1-5: Void

Table A.7.6.1.4.1-6:Void

A.7.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2 Inter-frequency Measurements

A.7.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs	Synchronous cells.
T1	s	Config 1	5	
T2	s	Config 1	5.2 for PC1; 3.5 for other PC	

Table A.7.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		Config 1	Setup 3 as specified in clause A.3.15			
			AoA1		AoA2	

Beam Assumption Note 7		1,2	Rough		Rough	
NR RF Channel Number		Config 1	1		2	
Duplex mode		Config 1	TDD		TDD	
TDD configuration		Config 1	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		Config 1	66		66	
BWP BW	MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration: Initial DL BWP		Config 1	DLBWP.0.1		N/A	
BWP configuration: Initial UL BWP		Config 1	ULBWP.0.1		N/A	
BWP configuration: Dedicated DL BWP		Config 1	DLBWP.1.1		N/A	
BWP configuration: Dedicated UL BWP		Config 1	ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1	OP.1		OP.1	
PDSCH Reference measurement channel		Config 1	SR.3.1 TDD		-	
CORESET Reference Channel		Config 1	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	120		120	
TRS configuration		Config 1	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI state		Config 1	TCI.State.2		N/A	
EPRE ratio of PSS to SSS		Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$\hat{E}_s$	dBm/SCS	Config 1	-87	-87	-Infinity	-87
SSBRP Note 3	dBm/SCS Note5	Config 1	-87	-87	-Infinity	-87
$\hat{E}_s/I_{ot}$ BB Note 8	dB	Config 1	1.89	1.89	-Infinity	1.89
Io Note3	dBm/95.04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01
Propagation Condition		Config 1	AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	VoidNote 3: SSBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	s	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	s	Config 1	5		
T2	s	Config 1	8 for PC1; 5 for other PC	82 for PC1; 52 for other PC	

Table A.7.6.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7			Config 1	Rough		Rough	
NR RF Channel Number			Config 1	1		2	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1	
Duplex mode			Config 1	TDD		TDD	
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	66		66	
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD		-	
CORESET Reference Channel			Config 1	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120	
TRS configuration			Config 1	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI state			Config 1	TCI.State.2		N/A	
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz Note5		-104.7		-104.7	
N_{oc} Note2		dBm/SCS Note4	Config 1	-95.7		-95.7	

SS-RSRP Note 3	dBm/SCS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
$\hat{E}_s/I_{ot}$	dB	Config 1	6	6	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1	6	6	-Infinity	9
Io Note3	dBm/95.04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Void Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.6.2.2.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.3.1-1, A.7.6.2.3.1-2, and A.7.6.2.3.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs	Synchronous cells.
T1	s	Config 1	5	
T2	s	Config 1	7 for PC1; 4.5 for other PC	

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1	Setup 3 as specified in clause A.3.15			
				AoA1		AoA2	
Beam Assumption Note 7			Config 1	Rough		Rough	
NR RF Channel Number			Config 1	1		2	
Duplex mode			Config 1	TDD		TDD	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	66		66	
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD		-	
CORESET Reference Channel			Config 1	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120	
TRS configuration			Config 1	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI state			Config 1	TCI.State.2		N/A	
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
$\hat{E}_s$		dBm/SCS	Config 1	-87	-87	-Infinity	-87
SSBRP Note 3		dBm/SCS Note5	Config 1	-87	-87	-Infinity	-87
$\hat{E}_s/I_{ot}$ BB Note 8		dB	Config 1	1.89	1.89	-Infinity	1.89

Io Note3	dBm/95.04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01
Propagation Condition		Config 1	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: SBRP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Void Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation Note 8: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.						

A.7.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

The UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.4.1-1, A.7.6.2.4.1-2, and A.7.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	s	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	s	Config 1	5		
T2	s	Config 1	11 for PC1; 6.5 for other PC	108 for PC1; 67 for other PC	

Table A.7.6.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7			Config 1	Rough		Rough	
NR RF Channel Number			Config 1	1		2	
Duplex mode			Config 1	TDD		TDD	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	66		66	
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD		-	
CORESET Reference Channel			Config 1	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120	
TRS configuration			Config 1	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI state			Config 1	TCI.State.2		N/A	
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz Note5		-104.7		-104.7	
N_{oc} Note2		dBm/SCS Note4	Config 1	-95.7		-95.7	

SS-RSRP Note 3	dBm/SCS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
$\hat{E}_s/I_{ot}$	dB	Config 1	6	6	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1	6	6	-Infinity	9
Io Note3	dBm/95.04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Void Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.6.2.4.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 no gap pattern is configured as defined in Table A.7.6.2.5.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.5.1-1.

Table A.7.6.2.5.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		One NR FR1 and one NR FR2 carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
CSI-RS for tracking parameters on NR RF Channel 1		Config 1	TRS.1.1 FDD		
		Config 2	TRS.1.1 TDD		
		Config 3	TRS.1.2 TDD		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3	-105		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	5.2 for PC1; 3.5 for other PC	3 for PC1; 2 for other PC	

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1,2,3	N/A		Setup 1 as specified in clause A.3.15	
Beam Assumption[Note 7]			Config 1,2,3	N/A		Rough	
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD		TDD	
			Config 2,3	TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.3.1	
			Config 2	TDDConf.1.1		TDDConf.3.1	
			Config 3	TDDConf.2.1		TDDConf.3.1	
$BW_{channel}$		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	52		66	
			Config 2	52		66	
			Config 3	106		66	
BWP BW		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		-	
			Config 2	SR.1.1 TDD			
			Config 3	SR.2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR.2.1 TDD			
Dedicated CORESET RMC configuration			Config 1	CCR.1.1 FDD		-	
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2		SMTC.2	
			Config 2,3	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15		120	
			Config 3	30		120	
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS			Config 1,2,3	0		0	

EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
$\hat{E}_s$	dBm/SCS	Config 1,2,3	NA Link only, see clause A.3.7A	-Infinity	-87
SSB_RP Note 3	dBm/SCS Note5	Config 1,2		-Infinity	-87
		Config 3		-Infinity	-87
$\hat{E}_s/I_{ot}$ BB Note 8	dB	Config 1,2,3		-Infinity	14.69
	dBm/95.04 MHz Note5	Config 1,2,3		-Infinity	-58.01
Propagation Condition		Config 1,2,3		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: SS B_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Void
Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 2, without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

2560 for UE supporting power class 1, or

1600 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 no gap pattern is configured as defined in Table A.7.6.2.6.1-2. If a UE supports per-FR gap it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2				One NR FR1 and one NR FR2 carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2				NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		Gap not configured		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		N/A		
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1 FR1				As specified in clause A.3.10.1
		Config 2	SSB.1 FR1				As specified in clause A.3.10.1
		Config 3	SSB.2 FR1				As specified in clause A.3.10.1
CSI-RS for tracking parameters on NR RF Channel 1		Config 1	TRS.1.1 FDD				
		Config 2	TRS.1.1 TDD				
		Config 3	TRS.1.2 TDD				
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2				As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	-105				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX.7	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	8 for PC1; 5 for other PC	82 for PC1; 52 for other PC	8 for PC1; 5 for other PC	82 for PC1; 52 for other PC	

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1,2,3	NA		Setup 1 as specified in clause A.3.15	
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD		TDD	
			Config 2,3	TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.3.1	
			Config 2	TDDConf.1.1		TDDConf.3.1	
			Config 3	TDDConf.2.1		TDDConf.3.1	
$BW_{channel}$		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	52		66	
			Config 2	52		66	
			Config 3	106		66	
BWP BW		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		-	
			Config 2	SR.1.1 TDD			
			Config 3	SR.2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR.2.1 TDD			
Dedicated CORESET RMC configuration			Config 1	CCR.1.1 FDD		-	
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2		SMTC.2	
			Config 2,3	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15		120	
			Config 3	30		120	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							

EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2	dBm/15 kHz Note5		NA Link only, see clause A.3.7A	-104.7	
N_{oc} Note2	dBm/SCS Note4	Config 1,2		-95.7	
		Config 3		-95.7	
SSB_RP Note 3	dBm/SCS Note5	Config 1,2		-Infinity	-86.7
		Config 3		-Infinity	-86.7
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3		-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3		-Infinity	9
Io Note3	dBm/9.36MHz	Config 1,2		-	-
	dBm/38.16MHz	Config 3		-	-
	dBm/95.04 MHz Note5	Config 1,2,3		-66.7	-57.2
Propagation Condition		Config 1,2,3	AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement no gap pattern is configured as defined in Table A.7.6.2.7.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.7.1-1.

Table A.7.6.2.7.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		One NR FR1 and one NR FR2 carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
CSI-RS for tracking parameters on NR RF Channel 1		Config 1	TRS.1.1 FDD		
		Config 2	TRS.1.1 TDD		
		Config 3	TRS.1.2 TDD		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	7 for PC1; 4.5 for other PC	3.5 for PC1; 2.5 for other PC	

Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
AoA setup			Config 1,2,3	NA		Setup 1 as specified in clause A.3.15	
Beam Assumption[Note 7]			Config 1,2,3	N/A		Rough	
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD		TDD	
			Config 2,3	TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.3.1	
			Config 2	TDDConf.1.1		TDDConf.3.1	
			Config 3	TDDConf.2.1		TDDConf.3.1	
$BW_{channel}$		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	52		66	
			Config 2	52		66	
			Config 3	106		66	
BWP BW		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		-	
			Config 2	SR.1.1 TDD			
			Config 3	SR.2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR.2.1 TDD			
Dedicated CORESET RMC configuration			Config 1	CCR.1.1 FDD		-	
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2		SMTC.2	
			Config 2,3	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15		120	
			Config 3	30		120	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							

EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
$\hat{E}_s$	dBm/SCS	Config 1,2, 3		-Infinity	-87
SSB_RP Note 3	dBm/SCS Note5	Config 1,2		-Infinity	-87
		Config 3		-Infinity	-87
$\hat{E}_s/I_{ot}$ BB Note 8	dB	Config 1,2,3	NA Link only, see clause A.3.7A	-Infinity	14.69
	dBm/95.04 MHz Note5	Config 1,2,3		Infinity	-58.01
Propagation Condition		Config 1,2,3		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: SSB_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Void Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation Note 8: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.					

A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 2 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

3360 for UE supporting power class 1, or

2080 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement no gap pattern is configured as defined in Table A.7.6.2.8.1-2.If a UE supports per-FR gap , it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.8.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2				One NR FR1 and one NR FR2 carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2				NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		Gap not configured		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		N/A		
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1 FR1				As specified in clause A.3.10.1
		Config 2	SSB.1 FR1				As specified in clause A.3.10.1
		Config 3	SSB.2 FR1				As specified in clause A.3.10.1
CSI-RS for tracking parameters on NR RF Channel 1		Config 1	TRS.1.1 FDD				
		Config 2	TRS.1.1 TDD				
		Config 3	TRS.1.2 TDD				
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2				As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	-105				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX.7	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	11 for PC1; 6.5 for other PCTBD	108 for PC1; 67 for other PCTBD	11 for PC1; 6.5 for other PCTBD	108 for PC1; 67 for other PCTBD	

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
AoA setup			Config 1,2,3	NA		Setup 1 as specified in clause A.3.15	
Beam Assumption[Note 7]			Config 1,2,3	N/A		Rough	
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	FDD		TDD	
			Config 2,3	TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.3.1	
			Config 2	TDDConf.1.1		TDDConf.3.1	
			Config 3	TDDConf.2.1		TDDConf.3.1	
$BW_{channel}$		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
Data RBs allocated			Config 1	52		66	
			Config 2	52		66	
			Config 3	106		66	
BWP BW		MHz	Config 1	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 2	10: $N_{RB,c}$ = 52		100: $N_{RB,c}$ = 66	
			Config 3	40: $N_{RB,c}$ = 106		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		-	
			Config 2	SR.1.1 TDD			
			Config 3	SR.2.1 TDD			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD		-	
			Config 2	CR.1.1 TDD			
			Config 3	CR.2.1 TDD			
Dedicated CORESET RMC configuration			Config 1	CCR.1.1 FDD		-	
			Config 2	CCR.1.1 TDD			
			Config 3	CCR.2.1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2		SMTC.2	
			Config 2,3	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15		120	
			Config 3	30		120	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							

EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2	dBm/15 kHz Note5			-104.7	
N_{oc} Note2	dBm/SCS Note4	Config 1,2		-95.7	
		Config 3		-95.7	
SSB_RP Note 3	dBm/SCS Note5	Config 1,2		-Infinity	-86.7
		Config 3		-Infinity	-86.7
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	NA Link only, see clause A.3.7A	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3		-Infinity	9
Io Note3	dBm/9.36MHz	Config 1,2		-	-
	dBm/38.16MHz	Config 3		-	-
	dBm/95.04 MHz Note5	Config 1,2,3		-66.7	-57.2
Propagation Condition		Config 1,2,3		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.9 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2) (rel16 additional mandatory gap pattern 17)

A.7.6.2.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.9.1-1, A.7.6.2.9.1-2, and A.7.6.2.9.1-3.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.9.1-1.

Table A.7.6.2.9.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.9.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection (GP17)

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	17	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-30	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs	Synchronous cells.
T1	s	Config 1	5	
T2	s	Config 1	6 (PC1) 4 (other PC)	

Table A.7.6.2.9.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection (GP17)

Parameter	Unit	Test configuration	Cell 1		Cell 1	
			T1	T2	T1	T2
AoA setup		Config 1	Setup 3 as specified in clause A.3.15			
			AoA1		AoA2	

Beam assumption[Note 7]			Config 1	Rough	Rough
NR RF Channel Number			Config 1	1	2
Duplex mode			Config 1	TDD	TDD
TDD configuration			Config 1	TDDConf.3.1	TDDConf.3.1
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1	N/A
	Initial UL BWP			ULBWP.0.1	N/A
	Dedicated DL BWP			DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A

OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1	OP.1		OP.1	
PDSCH Reference measurement channel		Config 1	SR.3.1 TDD		-	
CORESET Reference Channel		Config 1	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	120		120	
TRS configuration		Config 1	TRS.2.1 TDD		N/A	
TCI configuration		Config 1	CSI-RS.Config.0		N/A	
EPRE ratio of PSS to SSS		Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz Note5		N/A		N/A	
N_{oc} Note2	dBm/SCS Note4	Config 1	N/A		N/A	
SS-RSRP Note 3	dBm/SCS Note5	Config 1	-87	-87	-Infinity	-87
$\hat{E}_s/I_{ot}$	dB	Config 1	N/A	N/A	-Infinity	N/A
$\hat{E}_s/N_{oc}$	dB	Config 1	N/A	N/A	-Infinity	N/A
Io Note3	dBm/95.04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01
Propagation Condition		Config 1	AWGN			

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.9.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120ms (PC1) or 3200ms (other than PC1) from the beginning of time period T2.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.10 SA event triggered reporting test without gap under non-DRX

A.7.6.2.10.1 Test Purpose and Environment

The purpose of this test is to verify that if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the network, the UE makes correct reporting of an event. This test will partly verify the inter-frequency without gap cell search requirements in clause 9.3.9. Supported test configurations are shown in table A.7.6.2.10.1-1.

Table A.7.6.2.10.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

There are two cells in the test, NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The SSB of Cell 2 is completely within UE's active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.2.10.1-2, A.7.6.2.10.1-3 and A.7.6.2.10.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.2.10.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1	PCell (Cell 1)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		1	Cell 2	NR cell 2 is on NR RF channel number 2.
RF Channel Number		1	1, 2	Two FR2 NR carrier frequencies is used.
SMTC configuration		1	SMTC.1	
A3-Offset	dB	1	-6	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	s	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	OFF	
Time offset between Cell 1 and Cell 2		1	3 μs	Synchronous cells
T1	s	1	5	
T2	s	1	5	

Table A.7.6.2.10.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Intial BWP configuration		1	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1	SSB		SSB	
PDSCH RMC configuration		1	SR.3.1 TDD		N/A	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
TRS configuration		1	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI states		1	TCI.State.2		N/A	
OCNG Patterns		1	OP.1		OP.1	
SSB		1	SSB.3 FR2		SSB.3 FR2	
Propagation Condition		1	AWGN			

Table A.7.6.2.10.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1	Rough		Rough	
$\hat{E}_s/I_{ot}$	dB	1	4	4	-Infinity	8
N_{oc} Note 2	dBm/15 KHz	1	-102			
N_{oc} Note 2	dBm/SCS	1	-93			
SS-RSRP	dBm/SCS	1	-89	-89	-Infinity	-85
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	8
Io	dBm/95.04MHz	1	-58.56		-55.38	
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.6.2.10.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.11 SA event triggered reporting test without gap under DRX

A.7.6.2.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD inter-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.2.11.1-1.

Table A.7.6.2.11.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test: PCell (Cell 1) on NR RF channel 1 and a FR2 neighbour cell (Cell 2) on NR RF channel 2. The SSB of Cell 2 is completely within UE's active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.2.11.1-2 ~ 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.11.1-2: General test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Value	Comment
NR RF Channel Number		1, 2	1, 2	2 TDD carrier frequency are used for the NR cells.
Active cell		1, 2	PCell (Cell 1)	Cell 1 is on NR RF channel number 1.
Neighbour cell		1, 2	Cell 2	Cell to be identified. Cell 2 is on NR RF channel number 2.
SMTC configuration		1, 2	SMTC.1	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	s	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	DRX.7	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	s	1, 2	5	
T2	s	1, 2	52	

Table A.7.6.2.11.1-3: NR Cell specific test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number		1, 2	1		2	
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1, 2	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1, 2	DLBWP.1.1		N/A	
Active UL BWP configuration		1, 2	ULBWP.1.1		N/A	
RLM-RS		1, 2	SSB		N/A	
PDSCH RMC configuration		1, 2	SR.3.1 TDD		N/A	
RMSI CORESET RMC configuration		1, 2	CR.3.1 TDD		N/A	
Dedicated CORESET RMC configuration		1, 2	CCR.3.1 TDD		N/A	
TRS configuration		1, 2	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI states		1, 2	TCI.State.2		N/A	
OCNG Patterns		1, 2	OP.1		OP.1	
SSB		1	SSB.3 FR2		SSB.3 FR2	
		2	SSB.4 FR2		SSB.4 FR2	
Propagation Condition		1, 2	AWGN			

Table A.7.6.2.11.1-4: NR OTA Cell specific test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1,2	Rough		Rough	
$\hat{E}_s/I_{ot}$	dB	1, 2	4	-1.46	-Infinity	-1.46
N_{oc} Note 2	dBm/15 KHz	1, 2	-98			
N_{oc} Note 2	dBm/SCS	1	-89			
		2	-86			
SS-RSRP	dBm/SCS	1	-85	-85	-Infinity	-85
		2	-82	-82	-Infinity	-82
$\hat{E}_s/N_{oc}$	dB	1, 2	4	4	-Infinity	4
Io	dBm/95.04MHz	1	-54.53	-52.18	-54.53	-52.18
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.						

A.7.6.2.11.2 Test Requirements

In test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4est

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3 L1-RSRP measurement for beam reporting

A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.7.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
$BW_{channel}$	1~2	MHz	100: $N_{RB,c}$ = 66
Data RBs allocated	1~4		66
PDSCH Reference measurement channel	1		SR.3.2 TDD
	2		SR.3.3 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
	2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
	2		CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2
	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	s	5
T2	1~2	s	2
EPRE ratio of PSS to SSS	1~2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			
Beam Assumption Note 4	1-2		Rough			
N_{oc} Note2	1~2	dBm/15kHz	-105			
N_{oc} Note2	1	dBm/SSB SCS	-96			
	2		-93			
$\hat{E}_s/I_{ot}$	1~2	dB	0	0	-Infinity	9
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87
	2		-93	-93	-Infinity	-84
Io Note3	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
	2		-63.97	-63.97	-66.98	-57.47
$\hat{E}_s/N_{oc}$	1~2	dB	0	0	-Infinity	9

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.7.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.3.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.2.2-1 and Table A.7.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
$BW_{channel}$	1~2	MHz	100: $N_{RB,c}$ = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1		SR.3.2 TDD
	2		SR.3.3 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
	2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
	2		CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2
	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	s	5
T2	1~2	s	3
EPRE ratio of PSS to SSS	1~2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			
Beam Assumption Note 4	1-2		Rough			
N_{oc} Note2	1~2	dBm/15kHz	-105			
N_{oc} Note2	1	dBm/SSB SCS	-96			
	2		-93			
$\hat{E}_s/I_{ot}$	1~2	dB	0	0	-Infinity	9
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87
	2		-93	-93	-Infinity	-84
Io Note3	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
	2		-63.97	-63.97	-66.98	-57.47
$\hat{E}_s/N_{oc}$	1~2	dB	0	0	-Infinity	9

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.7.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.3.1-1.

Table A.7.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.3.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.3.2-1 and Table A.7.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		Off
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0
			SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	s	5
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.3.3.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1		Setup 1 according to A.3.15.1	
Beam Assumption Note 4	1		Rough	Rough
N_{oc} Note1	1	dBm/15kHz	-105	
N_{oc} Note1	1	dBm/SSB SCS	-95.97	
$\hat{E}_s/I_{ot}$	1	dB	0	9
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97	-86.97
Io Note2	1	dBm/95.04MHz	-63.97	-57.47
$\hat{E}_s/N_{oc}$	1	dB	0	9
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of [-10 ~ +20] dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
CSI-RS0	CSI-RS _RP0 -δ + G_{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 +δ + G_{max}
CSI-RS1	CSI-RS _RP1 -δ + G_{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 +δ + G_{max}
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.7.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.4.1-1.

Table A.7.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.3.4.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.4.2-1 and Table A.7.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		DRX.3
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	s	5
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.3.4.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1		Setup 1 according to A.3.15.1	
Beam Assumption Note 4	1		Rough	Rough
N_{oc} Note1	1	dBm/15kHz	-105	
N_{oc} Note1	1	dBm/SSB SCS	-95.97	
$\hat{E}_s/I_{ot}$	1	dB	0	9
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97	-86.97
Io Note2	1	dBm/95.04MHz	-63.97	-57.47
$\hat{E}_s/N_{oc}$	1	dB	0	9
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.6.3.3.3 Test Requirements

After 1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of [-10 ~ +20] dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
CSI-RS0	CSI-RS _RP0 -δ + G_{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 +δ + G_{max}
CSI-RS1	CSI-RS _RP1 -δ + G_{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 +δ + G_{max}
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.6.4 CLI measurements

A.7.6.4.1 SRS-RSRP measurement with non-DRX

A.7.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of SRS-RSRP measurement. This test will verify the SRS-RSRP measurement requirements in clause 9.7.2.5 with the testing configurations for NR cells in Table A.7.6.4.1.1-1.

Table A.7.6.4.1.1-1: Applicable NR configurations for FR2 SRS-RSRP test

Configuration	Description
1	NR 120 kHz SRS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.6.4.1.2 Test Parameters

One cell is deployed in the test, which is FR2 PCell (Cell 1). The test parameters for PCell is given in Table A.7.6.4.1.2-1 ~ A.7.6.4.1.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event I1 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively.

During the test, the test system transmits SRS resource for measurement in the DL slot according to the SRS configuration in Table A.7.6.4.1.2-4 and the test parameters for the (virtual) neighbour cell UE in Table A. 7.6.4.1.2-3. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on SRS symbol to be transmitted and on 2 data symbols before SRS to be transmitted.

Table A.7.6.4.1.2-1: General test parameters for SRS-RSRP event triggered reporting for PCell in FR2

Parameter	Unit	Test configuration	Value	Comment
Active cell		1	Cell 1	
RF Channel Number		1	1: Cell 1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC.1	
SRS configuration		1	SRSConf.1	Table A.7.6.4.1.2-4
CP length		1	Normal	
i1-Threshold	dBm	1	-103	
Hysteresis	dB	1	0	
Time To Trigger	s	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1	OFF	Non-DRX
Time offset between DL from serving cell and SRS from test system	µs	1	10.67	
T1	s	1	5	
T2	s	1	1	

Table A.7.6.4.1.2-2: NR Cell specific test parameters for SA SRS-RSRP event triggered reporting for PCell in FR2

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1	TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD	
RMSI CORESET RMC configuration		1	CR.3.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD	
OCNG Patterns		1	OP.1	
TRS configuration			TRS.2.1. TDD	
PDSCH/PDCCH TCI state		1	TCI.State.2	
Initial BWP configuration		1	DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1	DLBWP.1.1	
Active UL BWP configuration		1	ULBWP.1.1	
Propagation Condition		1	AWGN	

Table A.7.6.4.1.2-3: NR OTA Cell specific test parameters for SA SRS-RSRP event triggered reporting for PCell and neighbour cell UE in FR2

Parameter	Unit	Test configuration	Cell 1		Neighbour cell UE	
			T1	T2	T1	T2
AoA setup		1	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1	Fine			
N_{oc} Note 2	dBm/15 kHz	1	-98		-98	
N_{oc} Note 2	dBm/SCS	1	-89		-89	
$\hat{E}_s/I_{ot}$	dB	1	-	-	-infinity	4
$\hat{E}_s/N_{oc}$	dB	1	-	-	-infinity	4
SRS-RSRP Note 3	dBm/SCS kHz	1	-	-	-infinity	-94
Io	dBm/95.04 MHz	1	-70.01	-68.82	-70.01	-68.82

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SRS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Table A.7.6.4.1.2-4: SRS configuration for measurement reporting

	Field	SRSConf.1	Comments
SRS-ResourceSet	srs-ResourceSetId	0	
	srs-ResourceIdList	0	
	resourceType	Periodic	
	Usage	Codebook	
SRS-Resource	SRS-ResourceId	0	
	nrofSRS-Ports	Port1	
	transmissionComb	n2	
	combOffset-n2	0	
	cyclicShift-n2	0	
	resourceMapping startPosition	0	
	resourceMapping nrofSymbols	n1	
	resourceMapping repetitionFactor	n1	
	freqDomainPosition	0	
	freqDomainShift	0	
	freqHopping c-SRS	12	
	freqHopping b-SRS	0	
	freqHopping b-hop	0	
	groupOrSequenceHopping	Neither	
	resourceType	Periodic	
	periodicityAndOffset	sl40, 25	
	sequenceId	0	Any 10 bit number

A.7.6.4.1.3 Test Requirements

The UE shall send one Event I1 triggered measurement report, with a measurement reporting delay less than 60 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.4.2 CLI-RSSI measurement with non-DRX

A.7.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of CLI-RSSI measurement. This test will verify the CLI-RSSI measurement requirements in clause 9.7.3.5 with the testing configurations for NR cells in Table A.7.6.4.2.1-1.

Table A.7.6.4.2.1-1: Applicable NR configurations for FR2 CLI-RSSI test

Configuration	Description
1	NR 120 kHz SCS, 100 MHz bandwidth, TDD duplex mode

A.7.6.4.2.2 Test Parameters

One cell is deployed in the test, which is FR2 PCell (Cell 1). The test parameters for PCell is given in Table A.7.6.4.2.2-1 ~ A.7.6.4.2.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event I1 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively.

During the test, the test system does not transmit PDCCH/PDSCH/OCNG on symbols for CLI-RSSI measurement resource and on 2 data symbols before. The CLI-RSSI measurement resource configuration is in Table A.7.6.4.2.2-4.

Table A.7.6.4.2.2-1: General test parameters for CLI-RSSI event triggered reporting for PCell in FR2

Parameter	Unit	Test configuration	Value	Comment
Active cell		1	NR Cell 1	
RF Channel Number		1	1: Cell 1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC.1	
CLI-RSSI configuration		1	CLI-RSSIConf.1	Table A.7.6.4.2.2-4
CP length		1	Normal	
i1-Threshold	dBm	1	-94.5	
Hysteresis	dB	1	0	
Time To Trigger	s	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	OFF	Non-DRX
Time offset between DL from serving cell and OCNG from test system	μs	1	10.67	
T1	s	1	5	
T2	s	1	1	

Table A.7.6.4.2.2-2: NR Cell specific test parameters for CLI-RSSI event triggered reporting for PCell in FR2

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1	TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD	
PUSCH parameters		1	N/A	
RMSI CORESET RMC configuration		1	CR.3.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD	
OCNG Patterns Note 1		1	OP.1	
TRS configuration			TRS.2.1. TDD	
PDSCH/PDCCH TCI state		1	TCI.State.2	
Initial BWP configuration		1	DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1	DLBWP.1.1	
Active UL BWP configuration		1	ULBWP.1.1	
Propagation Condition		1	AWGN	
Note 1: OCNG is not transmitted in the CLI-RSSI measurement resources.				

Table A.7.6.4.2.2-3: NR OTA Cell specific test parameters for CLI-RSSI event triggered reporting for PCell in FR2

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
AoA setup		1	Setup 1 defined in A.3.15.1	
Beam assumption Note 3		1	Fine	Fine
N_{oc} on CLI-RSSI measurement resource Note 2	dBm/15 kHz	1	-119	-108
N_{oc} on CLI-RSSI measurement resource Note 2	dBm/SCS	1	-110	-99
Io on CLI-RSSI measurement resource	dBm/95.04 MHz	1	-81.01	-70.01
Io on CLI-RSSI measurement resource	dBm/1.08 MHz	1	-100.46	-89.46
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.				

Table A.7.6.4.2.2-4: CLI-RSSI measurement resource configuration for measurement reporting

	Field	CLI-RSSIConf.1
RSSI-Resource	rssi-ResourceId	0
	rssi-SCS	120
	startPRB	0
	nrofPRBs	66
	startPosition	3
	nrofSymbols	11
	rssi-PeriodicityAndOffset	sl40, 25

A.7.6.4.2.3 Test Requirements

The UE shall send one Event I1 triggered measurement report, with a measurement reporting delay less than 5ms from the beginning of time period T2. The nominal RSSI used to evaluate the requirement shall be based on Io.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.5 NR Measurements with autonomous gaps

A.7.6.5.1 SA interfrequency CGI reporting in autonomous gaps test (PCell in FR2)

A.7.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an CGI. This test will partly verify the SA inter-frequency NR cell search requirements in clause 8.2.1.2.16 and 9.11

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.5.1.1-1, A.7.6.5.1.1-2, and A.7.6.5.1.1-3.

Measurement gap patterns are configured. During T1 the UE shall report event A3 for cell 2. Within 3 seconds of the event report, the test equipment shall add a measurement reporting configuration using *ReportConfigNR* which containsa ReportCGI IE with cellForWhichToReportCGI set to the physical Cell ID of cell 2 and including the optional IE useAutonomousGaps-r16

In the measurement control information, it is indicated to the UE to decode the CGI of the neighbour cell using autonomous gaps. The test consists of two time phases, T1 and T2. Time period T2 begins 10ms after the test equipment has transmitted the RRC reconfiguration message containing the ReportCGI IE.

Supported test configurations are shown in table A.7.6.5.1.1-1.

Table A.7.6.5.1.1-1 SA interfrequency CGI reporting test in autonomous gaps

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.6.5.1.1-2: General test parameters for SA interfrequency CGI reporting in autonomous gaps

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
SI-RNTI scheduling rate	ms		40 ms	S-RNTI scheduled on four occasions per 160ms transmission period
A3-Offset	dB	Config 1	-30	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs	Synchronous cells.
T1	s	Config 1	<10	UE expected to report event A3 for cell 2 within 5,2s (PC1)or 3.5s (other PC) of the start of T1. Test equipment shall configure CGI reporting within 3s after receiving the event A3 report. T2 begins 10ms after test equipment has transmitted the RRC reconfiguration to configure CGI reporting.
T2	s	Config 1	1	

Table A.7.6.5.1.1-3: Cell specific test parameters SA interfrequency CGI reporting in autonomous gaps

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		Config 1	Setup 3 as specified in clause A.3.15			
			AoA1		AoA2	

Beam Assumption Note 7			1,2	Rough	
NR RF Channel Number			Config 1	1	2
Duplex mode			Config 1	TDD	TDD
TDD configuration			Config 1	TDDConf.3.1	TDDConf.3.1
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1	N/A
	Initial UL BWP			ULBWP.0.1	N/A
	Dedicated DL BWP			DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1	Not sent
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD	-
CORESET Reference Channel			Config 1	CR.3.1 TDD	-
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.1	SMTC.1
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120	120
TRS configuration			Config 1	TRS.2.1 TDD	N/A
TCI configuration			Config 1	CSI-RS.Config.0	N/A
EPRE ratio of PSS to SSS			Config 1	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		dBm/15 kHz Note5		-99.03	-99.03
N_{oc} Note2		dBm/SCS Note4	Config 1	-90	-90
SS-RSRP Note 3		dBm/SCS Note5	Config 1	-87	-93
$\hat{E}_s/I_{ot}$		dB	Config 1	3	-3
$\hat{E}_s/N_{oc}$		dB	Config 1	3	-3

Io[Note3]	dBm/95.04 MHz Note5	Config 1	-56.25	-59.25
Propagation Condition		Config 1	AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.6.5.1.2 Test Requirements

The UE shall report the CGI of cell 2 within 25*Tsmtc + 6*Tsi-rnti+20ms +2ms= 762ms from the start of T2, allow 765ms. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 775 ms the number of interrupted slots shall not exceed the allowed number as defined in clause 8.2.2.2.14.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.6 L1-SINR measurement for beam reporting

A.7.6.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured when DRX is not used

A.7.6.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.1, with the testing configurations for NR cells in Table A.7.6.6.1.1-1.

Table A.7.6.6.1.1-1: Applicable NR configurations for FR2 CSI-RS based L1-SINR test

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.6.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.1.2-1 and Table A.7.6.6.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources. After 160ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.6.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.6.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		Off
reportConfigType	1		aperiodic
reportQuantity	1		cri-SINR
reportQuantity-r16	1		cri-SINR-r16
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		26
Propagation condition	1		AWGN
T1	1	s	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1	dB	0
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.6.1.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1		Setup 1 according to A.3.15.1	
Beam assumption Note 3	1		Rough	
N_{oc} Note1	1	dBm/15kHz	-105	
N_{oc} Note1	1	dBm/SSB SCS	-95.97	
$\hat{E}_s/I_{ot}$	1	dB	0	9
CSI-RS RSRP Note3	1	dBm/SSB SCS	-95.97	-86.97
Io Note2	1	dBm/95.04MHz	-63.97	-57.47
$\hat{E}_s/N_{oc}$	1	dB	0	9
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.6.6.1.3 Test Requirements

After 160ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.28.1.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR when DRX is used

A.7.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements in clause 9.8.4.2, with the testing configurations for NR cells in Table A.7.6.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-IM based IMR

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.6.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.2.2-1 and Table A.7.6.6.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the SSBs and the associated CSI-IM resources, and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD measurements based on the SSBs, and UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-IM resources as IMR.

Table A.7.6.6.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
$BW_{channel}$	1~2	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
	2		SSB.2 FR2
CSI-IM configuration	1~2		CSI-IM.3.1 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		periodic
reportQuantity-r16	1~2		ssb-Index-SINR-r16
Number of reported RS	1~2		2
L1-SINR reporting period	1~2	slot	640
T1	1~2	s	5
T2	1~2	s	2
Propagation condition	1~2		AWGN
EPRE ratio of PSS to SSS	1~2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.6.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			
Beam assumption Note 4	1~2		Rough			
N_{oc} Note2	1~2	dBm/15kHz	-105			
N_{oc} Note2	1	dBm/SSB SCS	-96			
	2		-93			
$\hat{E}_s/I_{ot}$	1~2	dB	0	0	-Infinity	9
SSB RSRP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87
	2		-93	-93	-Infinity	-84
Io Note3	1	dBm/95.04MHz	-67.5	-67.5	-71.1	-60.7
	2		-67.5	-67.5	-71.1	-60.7
$\hat{E}_s/N_{oc}$	1~2	dB	0	0	-Infinity	9

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SSB RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.6.2.3 Test Requirements

The UE shall send L1-SINR report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-SINR report including the results for both SSB#0+CSI-IM#0 and SSB#1+CSI-IM#1 while meeting the accuracy requirements defined in clause 10.1.28.2, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.6.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR configured when DRX is used

A.7.6.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-SINR measurement. This test will partly verify the L1-SINR measurement requirements with CSI-RS based CMR and dedicated IMR cofigured in clause 9.8.4.3, with the testing configurations for NR cells in Table A.7.6.6.3.1-1.

Table A.7.6.6.3.1-1: Applicable NR configurations for FR2 L1-SINR test with CMR and dedicated IMR

Config	Description
1	LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.7.6.6.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.6.3.2-1 and Table A.7.6.6.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-SINR measurement on the configured CSI-RS as CMR and an associated CSI-RS as IMR, and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-SINR on aperiodic CSI-RS resources and the associated IMR. UE is also configured to measure L1-SINR based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.6.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs, and UE is configured to perform L1-SINR measurement based on the CSI-RS as CMR and the CSI-RS as IMR.

Table A.7.6.6.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS as CMR configuration	1		CSI-RS.3.3 TDD
CSI-RS as IMR configuration	1		CSI-RS.3.2A TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		DRX.3
reportConfigType	1		aperiodic
reportQuantity-r16	1		cri-SINR-r16
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		26
T1	1	s	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS[Note 1] EPRE ratio of OCNG to OCNG DMRS [Note 1]	1	dB	0
Propagation condition	1		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

Table A.7.6.6.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1	

Assumption for UE beams Note 3	1~2		Rough	
N_{oc} Note1	1~2	dBm/15kHz	-105	
N_{oc} Note1	1~2	dBm/SSB SCS	-95.97	
$\hat{E}_s/I_{ot}$	1~2	dB	0	9
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97	-86.97
Io Note2	1~2	dBm/95.04MHz	-63.97	-57.47
$\hat{E}_s/N_{oc}$	1~2	dB	0	9
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.6.6.3.3 Test Requirements

After 1440ms from the beginning of the test, the UE shall send L1-SINR report at slot 26 from the reception of DCI triggering the L1-SINR measurement. The L1-SINR report shall include the results for both CSI-RS#0 as CMR + CSI-RS#0 as IMR and CSI-RS#1 as CMR + CSI-RS#1 as IMR while meeting the accuracy requirement in clause 10.1.28.3. The reported L1-SINR value shall consider the Rx antenna gain in the range of [-10 ~ +20] dB when calculated.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.7 CSI-RS based intra-frequency Measurements

A.7.6.7.1 SA event triggered reporting test without gap under DRX for CSI-RS based intra-frequency measurement

A.7.6.7.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency measurement requirements in clause 9.10.2 and 9.10.3. Supported test configurations are shown in table A.7.6.7.1.1-1.

Table A.7.6.7.1.1-1: supported test configurations

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.	

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.7.1.1-2 ~ 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.7.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Value	Comment
			Test 1	
Active cell		1	PCell (Cell 1)	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
CSI-RS resource configuration		1	CSI-RS.RRM.FR2.1 TDD	
A3-Offset	dB	1	-6	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	s	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	DRX.1	DRX related parameters are defined in Table A.3.3
Time offset between Cell 1 and Cell 2	μs	1	0.58	
T1	s	1	5	
T2	s	1	10	

Table A.7.6.7.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
TDD configuration		1	TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Intial BWP configuration		1	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1	SSB		SSB	
PDSCH RMC configuration		1	SR.3.1 TDD		N/A	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		CR.3.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		CCR.3.1 TDD	
TRS configuration		1	TRS.2.1 TDD		N/A	
PDSCH/PDCCH TCI states		1	TCI.State.2		N/A	
OCNG Patterns		1	OP.1		OP.1	
SMTC		1	SMTC.1			
SSB		1	SSB.3 FR2		SSB.3 FR2	
CSI-RS		1	CSI-RS.RRM.FR2.1 TDD			
Propagation Condition		1	AWGN			

Table A.7.6.7.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1	Fine		Fine	
$\hat{E}_s/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46
N_{oc} Note 2	dBm/15 KHz	1	-98			
N_{oc} Note 2	dBm/SCS	1	-86			
CSI-RSRP	dBm/SCS	1	-82	-82	-Infinity	-82
SS-RSRP	dBm/SCS	1	-82	-82	-Infinity	-82
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
Io	dBm/95.04MHz	1	-54.53	-52.18	-54.53	-52.18

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: CSI-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Information about types of UE beam is given in B.2.1, and does not limit UE implementation or test system implementation.

A.7.6.7.1.2 Test Requirements

In this test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

- 9.6s for a UE supporting power class 1,
- 5.76s for a UE supporting power class 2, 3 and 4

The UE is required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.8 CSI-RS based inter-frequency Measurements

A.7.6.8.1 SA event triggered reporting tests for FR2 CSI-RS based measurement when non-DRX is used (PCell in FR2)

A.7.6.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event for CSI-RS based L3 measurement. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.10.3.5.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.8.1.1-1, A.7.6.8.1.1-2, and A.7.6.8.1.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.8.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.8.1.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.8.1.1-1: SA event triggered reporting tests for CSI-RS based L3 measurement for FR2-FR2

Config	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.6.8.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 CSI-RS based L3 measurement

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
SMTC configuration		Config 1	SMTC.1	As specified in clause A.3.11
A3-Offset	dB	Config 1	-6	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells	μs	Config 1	0.58	Synchronous cells.
T1	s	Config 1	5	
T2	s	Config 1	7 for PC1; 4.5 for other PC	

Table A.7.6.8.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 CSI-RS based L3 measurement

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
AoA setup			Config 1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7			Config 1	Rough		Rough	
NR RF Channel Number			Config 1	1		2	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1	
Duplex mode			Config 1	TDD		TDD	
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD		-	
CORESET Reference Channel			Config 1	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120	
TRS configuration			Config 1	TRS.2.1 TDD		N/A	
TCI configuration			Config 1	CSI-RS.Config.0		N/A	
CSI-RS configuration for RRM				-		CSI-RS.RRM.FR2.1 TDD	
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz Note5		-104.7		-104.7	
N_{oc} Note2		dBm/SCS Note4	Config 1	-95.7		-95.7	

CSI-RSRP Note 3	dBm/SCS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
SS-RSRP Note 3	dBm/SCS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
$\hat{E}_s/I_{ot}$	dB	Config 1	6	6	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1	6	6	-Infinity	9
Io Note3	dBm/95.04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.						

A.7.6.8.1.2 Test Requirements

In the test the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.9 RSTD measurements

A.7.6.9.1 NR RSTD measurement reporting delay test case for single positioning frequency layer in FR2 SA

A.7.6.9.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when single positioning frequency layer is configured.

Supported test configurations are shown in table A.7.7.1.1-1. The test parameters are as given in Table 7.6.7.1.1-2, Table A.7.6.9.1.1-3 and , Table A.7.6.9.1.1-4.

Table A.7.6.9.1.1-1: Supported test configurations for NR RSTD

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel distributed in single positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-DL-TDOA-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

Table A.7.6.9.1.1-2: General test parameters for RSTD measurement reporting delay

Parameter		Unit	Value	Comment
Reference cell			Cell 1	Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 38.215 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case.
Neighbor cells			Cell 2 and Cell 3	Cell 2 and Cell 3 appear at random places in the neighbour cell list in the DL-TDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list.
SSB configuration	Config 1		SSB.2 FR2	
SMTC configuration	Config 1		SMTC.1	
PDSCH RMC configuration	Config 1		SR.1.1 FDD	
RMSI CORESET RMC configuration	Config 1		CR.3.1 TDD	As specified in clause A.3.1.2.1
Dedicated CORESET RMC configuration	Config 1		CR.1.1 FDD	
PRS Configuration	Config 1		PRS.1.1. FR2	As specified in clause A.3. 31
Physical cell ID PCI			(PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0	The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters
CP length			Normal	
DRX			OFF	
Measurement gap			GP#24 or GP#13	GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured
Radio frame receive time offset between the cells at the UE antenna connector		μs	Cell 2 to Cell 1: 0 Cell 3 to Cell 1: 3	PRS are transmitted from synchronous cells
Expected RSTD		μs	Cell 2: 3 Cell 3: 3 Other neighbour cells: randomly between -3 and 3	The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator

Expected RSTD uncertainty for all neighbour cells	μs	5	The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index
Number of cells provided in DL-TDOA assistance data		16	Including the reference cell
PRS muting info		Cell 1: '10' Cell 2: '01' Cell 3: '10'	Correponds to prs-MutingInfo defined in TS 37.355 [24] Cell 1 and Cell 3 will be configured with different Comb patterns or resource offsets
T1	s	3	The length of the time interval from the beginning of each test
T2	s	[1.28]	The length of the time interval that follows immediately after time interval T1

Table A.7.6.9.1.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

Parameter		Unit	Cell 1	Cell 2	Cell 3
NR RF Channel Number			1	1	1
Positiong frequency layer			1	1	1
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.5 FDD	N/A	N/A
N_{oc} Note 3	Config 1	dBm/SCS	-89		
PRS $\hat{E}_s/N_{oc}$		dB	-Infinity	-Infinity	-Infinity
Io Note 4	Config 1	dBm/ 95.04MHz	-58.86	-60.01	-60.01
SSB RP Note4	Config 1	dBm/SCS	-89	-Infinity	-Infinity
$\hat{E}_s/N_{oc}$		dB	0	-Infinity	-Infinity
Propagation Condition			AWGN		
Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.					

Table A.7.6.9.1.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2

Parameter		Unit	Cell 1	Cell 2	Cell 3
			T2	T2	T2
RF Channel Number			1	1	1
Positiong frequency layer			1	1	1
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	OP.1	OP.1
PRACH configuration			FR1 PRACH configuration 1	FR1 PRACH configuration 1	FR1 PRACH configuration 1
N_{oc} Note 3	Config 1	dBm/SCS	-89	-89	-89
PRS $\hat{E}_s/N_{oc}$	Config 1	dB	-5.44	-11.67	-11.67
Io	Config 1	dBm/ 9.36MHz	-59.65	-59.92	-59.92
PRS $\hat{E}_s/I_{ot}$		dB	-6	-13	-13
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Table A.7.6.9.1.-5: NR OTA Cell specific test parameters for SA RSTD reporting for PCell and neighbour cell UE in FR2

Parameter	Unit	Test configuration	Cell 1		Cell2 and cell3	
			T1	T2	T1	T2
AoA setup		1	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1	Rough			
N_{oc} Note 2	dBm/SCS	1		-89		-89
$\hat{E}_s/I_{ot}$	dB	1	-	4	-infinity	4
$\hat{E}_s/N_{oc}$	dB	1	-	4	-infinity	4
Io	dBm/95.04 MHz	1	-70.05	-59.92	-70.05	-59.92

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

A.7.6.9.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.1.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD_0000000 and RSTD_1970049.

A.7.6.9.2 NR RSTD measurement reporting delay test case for dual positioning frequency layers in FR2 SA

A.7.6.9.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 9.9.2 in an environment with AWGN propagation conditions in FR2 in standalone scenario when dual positioning frequency layer is configured.

Supported test configurations are shown in table A.7.6.9.2.1-1. The test parameters are as given in Table 7.6.7.2.1-2, Table A.7.6.9.2.1-3 and , Table A.7.6.9.2.1-4.

Table A.7.6.9.2.1-1: Supported test configurations for NR RSTD

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the 2 RF channels distributed in dual positioning frequency layers.

The test consists of two consecutive time intervals, with duration of T1 and T2. During time duration T1, the UE shall not have any timing information of Cell 2 and Cell 3. All three cells transmit PRS during T2.Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The *NR-DL-TDOA-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-DL-TDOA-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 50 ms is the maximum processing time of the *DL-TDOA assistance* data and location information request.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources.

The UE is configured with measurement gap pattern ID # 24 or #13 before T2.

Table A.7.6.9.2.1-2: General test parameters for RSTD measurement reporting delay

Parameter		Unit	Value	Comment
Reference cell			Cell 1	Reference cell is the cell in the DL-TDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 37.355 [34]. The reference cell is the PCell in this test case.
Neighbor cells			Cell 2 and Cell 3	Cell 2 and Cell 3 appear at random places in the neighbour cell list in the DL-TDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list.
SSB configuration	Config 1		SSB.2 FR2	
SMTC configuration	Config 1		SMTC.1	
PDSCH RMC configuration	Config 1		SR.1.1 FDD	
RMSI CORESET RMC configuration	Config 1		CR.3.1 TDD	As specified in clause A.3.1.2.1
Dedicated CORESET RMC configuration	Config 1		CR.1.1 FDD	
PRS Configuration	Config 1		PRS.1.1. FR2	As specified in clause A.3.31
Physical cell ID PCI			(PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0	The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters
CP length			Normal	
DRX			OFF	
Measurement gap			GP#24 or GP#13	GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured
Radio frame receive time offset between the cells at the UE antenna connector		μs	Cell 2 to Cell 1: 0 Cell 3 to Cell 1: 3	PRS are transmitted from synchronous cells
Expected RSTD		μs	Cell 2: 3 Cell 3: 3 Other neighbour cells: randomly between -3 and 3	The expected RSTD is what is expected at the receiver. The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD indicator

Expected RSTD uncertainty for all neighbour cells	μs	5	The corresponding parameter in the DL-TDOA assistance data specified in TS 37.355 [34] is the expectedRSTD-Uncertainty index
Number of cells provided in DL-TDOA assistance data		16	Including the reference cell
PRS muting info		Cell 1: '10' Cell 2: '01' Cell 3: '10'	Correponds to prs-MutingInfo defined in TS 37.355 [24] Cell 1 and Cell 3 will be configured with different Comb patterns or resource offsets
T1	s	3	The length of the time interval from the beginning of each test
T2	s	1.28	The length of the time interval that follows immediately after time interval T1

Table A.7.6.9.2.1-3: Cell-specific test parameters for RSTD measurement reporting delay during T1

Parameter		Unit	Cell 1	Cell 2	Cell 3
NR RF Channel Number			1	1	2
Positiong frequency layer			1	1	2
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	N/A	N/A
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note 3	Config 1	dBm/SCS	-89		
PRS $\hat{E}_s/N_{oc}$		dB	-Infinity	-Infinity	-Infinity
Io Note 4	Config 1	dBm/95.04MHz	-58.86	-60.01	-60.01
SSB RP Note4	Config 1	dBm/SCS	-89	-Infinity	-Infinity
$\hat{E}_s/N_{oc}$		dB	0	-Infinity	-Infinity
Propagation Condition			AWGN		
Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 4: SSB RP and Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.					

Table A.7.6.9.2.1-4: Cell-specific test parameters for RSTD measurement reporting delay during T2 and T3

Parameter	Unit	Cell 1	Cell 2	Cell 3
		T2	T2	T2

RF Channel Number			1	1	2
Positiong frequency layer			1	1	2
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low	1x2 Low
OCNG patterns defined in A.3.2.1			OP.1	OP.1	N/A
PRACH configuration			FR1 PRACH configuration 1	FR1 PRACH configuration 1	FR1 PRACH configuration 1
N_{oc} Note 3	Config 1	dBm/SCS	-89	-89	-89
PRS $\hat{E}_s/N_{oc}$	Config 1	dB	-5.44	-11.67	-11.67
Io	Config 1	dBm/ 9.36MHz	-59.65	-59.92	-59.92
PRS $\hat{E}_s/I_{ot}$		dB	-6	-13	-13
Propagation Condition			AWGN		
Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					

Table A.7.6.9.2.1-5: NR OTA Cell specific test parameters for SA RSTD reporting for PCell and neighbour cell UE in FR2

Parameter	Unit	Test configuration	Cell 1		Cell2 and cell3	
			T1	T2	T1	T2
AoA setup		1	Setup 1 defined in A.3.15.1			
Beam assumption Note 4		1	Rough			
N_{oc} Note 2	dBm/SCS	1		-89		-89
$\hat{E}_s/I_{ot}$	dB	1	-	4	-infinity	4
$\hat{E}_s/N_{oc}$	dB	1	-	4	-infinity	4
Io	dBm/95.04 MHz	1	-70.05	-59.92	-70.05	-59.92
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.						

A.7.6.9.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 9.9.2.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the DL-TDOA assistance data, Cell 1, within the time duration specified in section 9.9.1.5 starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 10.1.23.3, i.e., between RSTD_0000000 and RSTD_1970049.

A.7.6.10 PRS-RSRP measurements

A.7.6.10.1 PRS-RSRP reporting delay test case for single positioning frequency layer

A.7.6.10.1.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9.3.5 for single positioning frequency layer under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.10.1.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.10.1.1-2, and table A.7.6.10.1.1-3.

Table A.7.6.10.1.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.6.10.1.1-2: General test parameters for PRS RSRP measurement reporting delay

Parameter	Unit	Test configuration	Value	Comment
NR RF Channel Number		Config 1	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
Active cell		Config 1	NR cell 1 (Pcell)	Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data.
Neighbour cell		Config 1	NR cell 2	Cell 2 is a neighbour cell in the positioning assistance data.
Gap Pattern Id		Config 1	GP#13 or GP#24 Note1	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC parameters		Config 1	SMTC.1	As specified in clause A.3.11
SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs	Synchronous cells.
Expected RSTD	μs	Config 1	3	
Expected RSTD uncertainty	μs	Config 1	5	
T1	s	Config 1	5	
T2	s	Config 1	7	
Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.				

Table A.7.6.10.1.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7			Config 1	Rough		Rough	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1	
Duplex mode			Config 1	TDD		TDD	
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD		-	
CORESET Reference Channel			Config 1	CR.3.1 TDD		-	
Dedicated CORESET RMC configuration			Config 1	CCR.3.1 TDD		-	
TRS configuration			Config 1	TRS.2.1 TDD		-	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120	
PRS configuration			Config 1	PRS.1.1 FR2		PRS.1.2 FR2	
PRS muting configuration			Config 1	'10'		'01'	
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz Note5		-102		-102	
N_{oc} Note2		dBm/SCS Note4	Config 1	-93		-93	
SS-RSRP Note 3		dBm/SCS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
PRS-RSRP Note 3		dBm/SCS Note5	Config 1	-Infinity	-96	-Infinity	-103

PRS $\hat{E}_s/I_{ot}$	dB	Config 1	-Infinity	-3	-Infinity	-10
PRS $\hat{E}_s/N_{oc}$	dB	Config 1	-Infinity	-3	-Infinity	-10
Io[Note3]	dBm/95.04 MHz Note5	Config 1	-58.56		-55.38	
Propagation Condition		Config 1	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.6.10.1.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5.The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP_0 and PRS RSRP_126.

A.7.6.10.2 PRS-RSRP reporting delay test case for dual positioning frequency layer

A.7.6.10.2.1 Test Purpose and Environment

The purpose of the test is to verify the PRS RSRP measurement requirements specified in Clause 9.9.3.5 for dual positioning frequency layers under AWGN propagation conditions in standalone scenario. Supported test configurations are shown in table A.7.6.10.2.1-1

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the different frequency from the PCell.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2. Both cells transmit PRS during T2.

The *NR-DL-AoD-RequestLocationInformation* message and *NR-DL-AoD-ProvideAssistanceData* message as defined in TS 37.355 shall be provided to the UE during T1. The last slot containing the two messages for the assistance data and location information request is denoted as #n.

The beginning of the time interval T2 shall be aligned with the beginning of the first MG instance containing the PRS resources that is ΔT after slot #n, where ΔT = 50 ms is the maximum processing time of the assistance data and location information request.

The test parameters are as given in table A.7.6.10.2.1-2, and table A.7.6.10.2.1-3.

Table A.7.6.10.2.1-1: supported test configurations for PRS RSRP measurement for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.6.10.2.1-2: General test parameters for PRS RSRP measurement reporting delay

Parameter	Unit	Test configuration	Value	Comment
Active cell		Config 1	NR cell 1 (Pcell)	Cell 1 is the PCell and the DL-AoD reference cell in the positioning assistance data.
Neighbour cell		Config 1	NR cell 2	Cell 2 is a neighbour cell in the positioning assistance data.
Gap Pattern Id		Config 1	GP#13 or GP#24[Note1]	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC parameters		Config 1	SMTC.1	As specified in clause A.3.11
SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs	Synchronous cells.
Expected RSTD	μs	Config 1	3	
Expected RSTD uncertainty	μs	Config 1	5	
T1	s	Config 1	5	
T2	s	Config 1	7	
Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#13 is configured.				

Table A.7.6.10.2.1-3: Cell-specific test parameters for PRS RSRP measurement reporting delay

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
AoA setup			Config 1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7			Config 1	Rough		Rough	
NR RF Channel Number			Config 1	1		2	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1	
Duplex mode			Config 1	TDD		TDD	
$BW_{channel}$		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP BW		MHz	Config 1	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		Config 1	DLBWP.0.1		N/A	
	Initial UL BWP			ULBWP.0.1		N/A	
	Dedicated DL BWP			DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.3.1 TDD		-	
CORESET Reference Channel			Config 1	CR.3.1 TDD		-	
Dedicated CORESET RMC configuration			Config 1	CCR.3.1 TDD		-	
TRS configuration			Config 1	TRS.2.1 TDD		-	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120	
PRS configuration			Config 1	PRS.1.1 FR2		PRS.1.2 FR2	
PRS muting configuration			Config 1	‘10’		‘01’	
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz Note5		-104.7		-104.7	
N_{oc} Note2		dBm/SCS Note4	Config 1	-95.7		-95.7	
SS-RSRP Note 3		dBm/SCS Note5	Config 1	-92.7	-92.7	-Infinity	-85.7

PRS-RSRP Note 3	dBm/SCS Note5	Config 1	-Infinity	-92.7	-Infinity	-85.7
PRS $\hat{E}_s/I_{ot}$	dB	Config 1	-Infinity	-3	-Infinity	-10
PRS $\hat{E}_s/N_{oc}$	dB	Config 1	-Infinity	-3	-Infinity	-10
Io Note3	dBm/95.04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP/PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.10.2.2 Test Requirements

The PRS RSRP measurement time fulfils the requirements specified in Clause 9.9.3.5.The UE shall perform and report the PRS RSRP measurements for Cell 2 with respect to the reference cell in the DL-AoD assistance data, Cell 1, within the time duration specified in section 9.9.3.5 starting from the beginning of time interval T2.

The rate of the correct events for the neighbour cell observed during repeated tests shall be at least 90%, where the reported PRS RSRP measurement for each correct event shall be within the PRS RSRP reporting range specified in Clause 10.1.24.3, i.e., between PRS RSRP_0 and PRS RSRP_126.

A.7.6.11 UE Rx-Tx time difference measurements

A.7.6.11.1 UE Rx-Tx time difference measurements for single positioning frequency layer in FR2 SA

A.7.6.11.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.7.6.11.1.1-1.

Table A.7.6.11.1.1-1: Supported test configurations

Config	Description
1	120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2. The beginning of the time interval T2 shall be aligned with the first PRS symbol in Cell 1 and Cell 2.

The *NR-Multi-RTT-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-Multi-RTT-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the multi-RTT assistance data.

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.1.1-2 and Table A.7.6.11.1.1-3 respectively. The SRS configuration parameters for UE Rx-Tx time difference test is given in Table A.7.6.11.1.1-4.

Table A.7.6.11.1.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Active cell		1	Cell 1	Cell 1 is the PCell in NR-Multi-RTT-ProvideAssistanceData [34].
Neighbour cell		1	Cell 2	Cell 2 is a neighbour cell in NR-Multi-RTT-ProvideAssistanceData [34].
RF Channel Number		1	1	For both Cell 1 and Cell 2
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66	
SSB configuration		1	SSB.2 FR2	
SMTC configuration		1	SMTC.1	
Measurement gap		1	GP#24 or GP#0 Note 1	
CP length		1	Normal	
DRX		1	OFF	
Time offset between serving and neighbour cells	μs	1	3	Synchronous cells
T1	s	1	5	
T2	s	1	20	
NOTE 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.				

Table A.7.6.11.1.1-3: Cell specific test parameters

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1	Setup 1 as specified in clause A.3.15			
Beam Assumption[Note 7]		1	Rough		Rough	
TDD configuration		1	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD		N/A	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		N/A	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		N/A	
OCNG Patterns		1	OP.1		OP.1	
TRS Configuration		1	TRS.2.1 TDD		N/A	
Initial BWP configuration		1	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1	DLBWP.1.1		N/A	
Active UL BWP configuration		1	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.1 FR2		PRS.1.1 FR2	
N_{oc} Note 2	dBm/SCS	1	-89			
N_{oc} Note 2	dBm/15 kHz	1	-98			
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-2.41	-Infinity	-12.12
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-2	-Infinity	-10
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-91	-Infinity	-99
Io	dBm/95.04 MHz	1	N/A	-57.63	N/A	-57.63
Propagation Condition		1	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table Table A.7.6.11.1.1-4: SRS configuration for UE Rx-Tx time difference test

SRS-ResourceId	0
nrofSRS-Ports	Port1
transmissionComb	n4
combOffset-n4	0
cyclicShift-n4	0
resourceMapping startPosition	0
resourceMapping nrofSymbols	n4
resourceMapping repetitionFactor	n1
freqDomainPosition	0
freqDomainShift	0
freqHopping c-SRS	Matches $N_{RB,c}$
groupOrSequenceHopping	Neither
resourceType	Periodic
periodicityAndOffset-p	160*2^u, 20*2^u
sequenceId	0

A.7.6.11.1.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

A.7.6.11.2 UE Rx-Tx time difference measurement period for dual positioning frequency layers in FR2 SA

A.7.6.11.2.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx measurement meets the requirements specified in clause 9.9.4.5 in AWGN propagation condition in FR2 in standalone scenario when dual positioning frequency layers are cnfigured.

The supported test configurations in listed in Table A.7.6.11.2.1-1.

Table A.7.6.11.2.1-1: Supported test configurations

Config	Description
1	120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on different RF channels in FR2.

The test consists of two consecutive time intervals, with duration of T1 and T2. Cell 1 and Cell 2 mute PRS transmission during T1 and transmit PRS during T2. The beginning of the time interval T2 shall be aligned with the first PRS symbol in Cell 1 and Cell 2.

The *NR-Multi-RTT-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE during T1. The last TTI containing the *NR-Multi-RTT-ProvideAssistanceData* shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the multi-RTT assistance data.

The UE is configured with measurement gap pattern ID #0 or ID #24 before T2.

The UE is configured to transmit SRS during T2.

The general test parameters and cell specific test parameters are as given in Table A.7.6.11.2.1-2 and Table A.7.6.11.2.1-3 respectively. The SRS configuration parameters for UE Rx-Tx time difference test is given in Table A.7.6.11.2.1-4.

Table A.7.6.11.2.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Active cell		1	Cell 1	Cell 1 is the PCell in *NR-Multi-RTT-ProvideAssistanceData* [34].
Neighbour cell		1	Cell 2	Cell 2 is a neighbour cell in *NR-Multi-RTT-ProvideAssistanceData* [34].
RF Channel Number		1	1	For Cell 1
RF Channel Number		1	2	For Cell 2
$BW_{channel}$	MHz	1	100: $N_{RB,c}$ = 66	
SSB configuration		1	SSB.2 FR2	
SMTC configuration		1	SMTC.1	
Measurement gap		1	GP#24 or GP#0 Note 1	
CP length		1	Normal	
DRX		1	OFF	
Time offset between serving and neighbour cells	μs	1	3	Synchronous cells
T1	s	1	5	
T2	s	1	20	
Note 1: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.				

Table A.7.6.11.2.1-3: Cell specific test parameters

Parameter	Unit	Test configuration	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7		1	Rough		Rough	
TDD configuration		1	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD		N/A	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		N/A	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		N/A	
OCNG Patterns		1	OP.1		OP.1	
TRS Configuration		1	TRS.2.1 TDD		N/A	
Initial BWP configuration		1	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1	DLBWP.1.1		N/A	
Active UL BWP configuration		1	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.1 FR2		PRS.1.1 FR2	
N_{oc} Note 2	dBm/SCS	1	-89			
N_{oc} Note 2	dBm/15 kHz	1	-98			
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-2.41	-Infinity	-12.12
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-2	-Infinity	-10
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-91	-Infinity	-99
Io	dBm/95.04 MHz	1	N/A	-57.89	N/A	-59.60
Propagation Condition		1	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table Table A.7.6.11.1.1-4: SRS configuration for UE Rx-Tx time difference test

SRS-ResourceId	0
nrofSRS-Ports	Port1
transmissionComb	n4
combOffset-n4	0
cyclicShift-n4	0
resourceMapping startPosition	0
resourceMapping nrofSymbols	n4
resourceMapping repetitionFactor	n1
freqDomainPosition	0
freqDomainShift	0
freqHopping c-SRS	Matches $N_{RB,c}$
groupOrSequenceHopping	Neither
resourceType	Periodic
periodicityAndOffset-p	160*2^u, 20*2^u
sequenceId	0

A.7.6.11.2.2 Test requirements

The UE Rx-Tx time difference measurement time fulfils the requirements specified in clause 9.9.4.5.

The UE shall perform and report the UE Rx-Tx time difference measurements for Cell 1 and Cell 2 within the specified UE Rx-Tx time difference measurement time starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported UE Rx-Tx measurement for each correct event shall be within the UE Rx-Tx reporting range specified in clause 10.1.25.3.1.

A.7.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.

- Measurements are performed in RRC_CONNECTED state.

- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.7.7.1 SS-RSRP

A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.7.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.1.1.2-2 and A.7.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter	Unit	T1		T2	
		Cell 1	Cell 2	Cell 1	Cell 2
Cell ID		489	0	489	0
SSB ARFCN		freq1		freq1	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		24		24	
Downlink initial BWP configuration		DLBWP.0.1	-	DLBWP.0.1	-
Downlink dedicated BWP configuration		DLBWP.1.1	-	DLBWP.1.1	-
Uplink initial BWP configuration		ULBWP.0.1	-	ULBWP.0.1	-
Uplink dedicated BWP configuration		ULBWP.1.1	-	ULBWP.1.1	-
DRX cycle configuration		Not applicable	-	Not applicable	-
TRS configuration		TRS.2.1 TDD	-	TRS.2.1 TDD	-
TCI state		TCI.State.0	-	TCI.State.0	-
PDSCH Reference measurement channel		SR.3.2TDD	-	SR.3.2 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated CORESET Reference channel		CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns		OP.3	OP.3	OP.3	OP.3
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
SMTC configuration		SMTC.1	SMTC.1	SMTC.1	SMTC.1
Time offset with Cell 1	μs	-	3	-	3
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to					

PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void Note 5: Void					

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter	Unit	T1		T2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1			
Assumption for UE beams Note 7		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-91.6		N/A	
N_{oc} Note1	dBm/SCS Note4	-82.6		N/A	
$\hat{E}_s/N_{oc}$	dB	6.0	1.0	N/A	N/A
E_s	dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)
SSB_RP Note2	dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)
$\hat{E}_s/I_{ot\_BB}$ Note6	dB	2.44	-5.98	-5.98	-5.98
Io Note2	dBm/95.04 MHz Note4	-50.05		(Table B.2.2-2 Rx Beam Peak +29.70dB)	
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SSB_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: Void Note 6: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4. Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
Cell 1	SSB_RP1 -δ +G_{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G_{max}
Cell 2	SSB_RP2 -δ +G_{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 +δ +G_{max}
Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 and 10.1.5.1.2 for intrer-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~2		freq1	freq2	freq1	freq2
$BW_{channel}$	1~2		100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated	1		24		24	
	2		48		48	
Gap pattern ID			0		0	
Duplex mode	1~2		TDD		TDD	
TDD configuration	1~2		TDDConf.3.1		TDDConf.3.1	
PDSCH Reference measurement channel	1		SR.3. 2 TDD	-	SR.3. 2 TDD	-
	2		SR.3.3 TDD		SR.3.3 TDD	
RMSI CORESET Reference Channel	1		CR.3.1 TDD	-	CR.3.1 TDD	-
	2		CR.3.2 TDD		CR.3.2 TDD	
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	-	CCR.3.1 TDD	-
	2		CCR.3.7 TDD		CCR.3.7 TDD	
SSB configuration	1		SSB.3 FR2		SSB.3 FR2	
	2		SSB.4 FR2		SSB.4 FR2	
PDSCH/PDCCH subcarrier spacing	1~2	kHz	120		120	
OCNG Patterns	1~2		OP.3		OP.3	
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3		DLBWP.1.3 ULBWP.1.3	
TRS Configuration	1~2		TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2		TCI.State.2	
SMTC configuration	1~2		SMTC.1		SMTC.1	
Time offset between Cell 2 and Cell 1	1~2	µs	3		3	
EPRE ratio of PSS to SSS	1~2	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition	1~2	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~2	-	1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void.						

Table A.7.7.1.2.2-2: SS-RSRP inter frequency OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration	1~2		Setup 4b according to clause A.3.15.4.2		Setup 4b according to clause A.3.15.4.2	
			AoA1 Spherical coverage	AoA2 Rx Beam Peak	AoA1 Spherical coverage	AoA2 Rx Beam Peak
Assumption for UE beams Note 7	1~2		Rough		Rough	
N_{oc} Note1	1	dBm/15kHz Note4	-90.6	-90.6	(Table B.2.3-2 Rx Beam Peak Note 8 +1.97dB)	(Table B.2.3-2 Rx Beam Peak Note 8 -3.03dB)
	2		-93.7	-93.7		
N_{oc} Note1	1	dBm/SCS Note4	-81.6	-81.6	(Table B.2.3-2 Rx Beam Peak Note 8 +11.0dB)	(Table B.2.3-2 Rx Beam Peak Note 8 +6.0dB)
	2		-81.7	-81.7	(Table B.2.3-2 Rx Beam Peak Note 8 +14.0dB)	(Table B.2.3-2 Rx Beam Peak Note 8 +9.0dB)
$\hat{E}_s/N_{oc}$	1~2	dB	6.0	6.0	17.0	-1.0
SSB_RP Note2	1	dBm/SCS	-75.6	-75.6	(Table B.2.3-2 Rx Beam Peak Note 8 +28.0dB)	(Table B.2. 3-2 Rx Beam Peak Note 8 +5.0dB)
	2		-75.7	-75.7	(Table B.2.3-2 Rx Beam Peak Note 8 +31.0dB)	(Table B.2. 3-2 Rx Beam Peak Note 8 +8.0dB)
($SSB\_RP_{Cell\ 1}$ – $SSB\_RP_{Cell\ 2}$)	1~2	dB	0		23.00	
$\hat{E}_s/I_{ot\ BB}$ Note6	1	dB	5.26	5.96	9.53	-3.46
	2		4. 61	5.91		
Io Note2	1	dBm/95.04 MHz Note4	-50.00	-50.00	(Table B.2.3-2 Rx Beam Peak Note 8 +52.68dB)	(Table B.2.3-2 Rx Beam Peak Note 8 +33.13dB)
	2		-50.09	-50.09	(Table B.2.3-2 Rx Beam Peak Note 8 +55.69dB)	(Table B.2.3-2 Rx Beam Peak Note 8 +36.14dB)
($Io_{freq\ 1}$ – $Io_{freq\ 2}$)	1~2	dB	0		19.55	

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SSB_RP, Es/Iot, Io, ($SSB\_RP_{Cell\ 2}$ – $SSB\_RP_{Cell\ 1}$) and ($Io_{freq\ 2}$ – $Io_{freq\ 1}$) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3:	Void
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	Void
Note 6:	Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P or ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	The value in Table B.2.3-2 is the Minimum SSB_RP for SCS_{SSB} = 120 kHz, selected according to the operating band of Cell 2 and UE power class, without $\Delta MB_{P,n}$ adjustment.

A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Table A.7.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3,4
Cell 1	SSB_RP1 -δ +G_{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G_{max}
Cell 2	SSB_RP2 -δ +G_{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 +δ +G_{max}
Note 1:	SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the Io used in the test
Note 3:	G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class
Note 4:	X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.

Table A.7.7.1.2.3-2: SS-RSRP relative accuracy test requirement

	Test requirement Notes1,2,3,4
Cell 2 – Cell 1	SSB_RP2 - SSB_RP1 -δ ≤ Reported RSRP(dB) ≤ SSB_RP2 - SSB_RP1 +δ –(X)
Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1 Note 3: Void Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.	

A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	

A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2 . The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~3		freq1	freq2	freq1	freq2
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	100: $N_{RB,c}$ = 66	10: $N_{RB,c}$ = 52	100: $N_{RB,c}$ = 66
	2		10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
Data RBs allocated	1,2		52	24	52	66
	3		106		106	
Duplex mode	1		FDD	TDD	FDD	TDD
	2		TDD		TDD	
	3		TDD		TDD	
TDD configuration	1		N/A	TDDConf. 3.1	N/A	TDDConf. 3.1
	2		TDDConf. 1.1		TDDConf. 1.1	
	3		TDDConf. 2.1		TDDConf. 2.1	
PDSCH Reference measurement channel	1		SR.1.1 FDD	-	SR.1.1 FDD	-
	2		SR.1.1 TDD		SR.1.1 TDD	
	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	-	CR.1.1 FDD	-
	2		CR.1.1 TDD	-	CR.1.1 TDD	-
	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
SSB configuration	1		SSB.1 FR1	SSB.3 FR2	SSB.1 FR1	SSB.3 FR2
	2		SSB.1 FR1		SSB.1 FR1	
	3		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~3		OP.1	OP.3	OP.1	OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~3		DLBWP.1.3 ULBWP.1.3		DLBWP.1.3 ULBWP.1.3	
TRS Configuration	1~3		TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~3		TCI.State.2		TCI.State.2	
SMTC configuration	1~3		SMTC.1		SMTC.1	
Time offset between Cell 2 and Cell 1	1~3	μs	3		3	
EPRE ratio of PSS to SSS	1~3	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH						

to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition	1~3	-	NA Link only, see clause A.3.7A	AWGN	NA Link only, see clause A.3.7A	AWGN
Antenna configuration	1~3	-		1x2		1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void						

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2 NOTE 3	
			Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b
Assumption for UE beams Note 4			N/A	Rough	N/A	Rough
N_{oc}	1~3	dBm/15 kHz	Link only, see clause A.3.7A	-90	Link only, see clause A.3.7A	NA
N_{oc}	1~3	dBm/SSB SCS				NA
$\hat{E}_s/N_{oc}$	1~3	dB		5		NA
E_s	1~3	dBm/SCS				(Table B.2.3-2 Spherical coverage +1dB)
SSB_RP Note1	1~3	dBm/SCS		-76.0		(Table B.2.3-2 Spherical coverage +1dB)
$\hat{E}_s/I_{ot\ BB}$ Note6	1~3	dB		4.35		-3.81
Io Note1	1~3	dBm/95.04MHz		-50.18		SSB_RP +28.98

Note 1: Es/Iot, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: Void
Note 3: No additional noise is added by the test system in Test 2.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 5: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 6: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

A.7.7.2 SS-RSRQ

A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. . The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			Freq1		Freq1	
Duplex mode			TDD		TDD	
TDD configuration			TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated			66		66	
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
TRS configuration			TRS.2.1 TDD		TRS.2.1 TDD	
TCI state			TCI.State.0		TCI.State.0	
PDSCH Reference measurement channel			SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET Reference Channel			CR.3.1 TDD	-	CR.3.1 TDD	
Control channel RMC			CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns			OP.1	OP.1	OP.1	OP.1
SMTC configuration			SMTC.1			
SSB configuration			SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
PDSCH/PDCCH subcarrier spacing		kHz	120	120	120	120
SS-RSSI-Measurement			Not Applicable			
EPRE ratio of PSS to SSS		dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition			AWGN		AWGN	
Antenna configuration			1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void Note 5: Void.						

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		Setup 1according to clause A.3.15.1	
Assumption for UE beams Note 9		Rough			
N_{oc} Note1	dBm/15kHz Note 4	-95		-95	
N_{oc} Note1	dBm/SCS Note3	-86		-86	
$\hat{E}_s/N_{oc}$	dB	3		3	
SSB_RP Note2	dBm/SCS Note4	-83	-83	-89	-89
SS-RSRQ Note2	dB	-14.77	-14.77	-16.81	-16.81
$\hat{E}_s/I_{ot}$	dB	-1.76	-1.76	-4.76	-4.76
Io Note2	dBm/95.04 MHz Note4	-50		-54	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-RSRQ, SSB_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6: Void
Note 7: Void
Note 8: Void
Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A. 7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			Freq1	freq2	freq1	Freq2
SSB Configuration			SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
Duplex mode			TDD		TDD	
TDD configuration			TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
TRS configuration			TRS.2. 1 TDD	-	TRS.2. 1 TDD	-
TCI state			TCI.Sta te.0	-	TCI.Sta te.0	-
Data RBs allocated			66		66	
PDSCH Reference measurement channel			SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel			CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns			OP.1	OP.1	OP.1	OP.1
SMTC configuration			SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2
PDSCH/PDCCH subcarrier spacing		kHz	120	120	120	120
EPRE ratio of PSS to SSS		dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS[Note 1]						
EPRE ratio of OCNG to OCNG DMRS [Note 1]						
Propagation conditions			AWGN	AWGN	AWGN	AWGN
Antenna configuration			1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void						

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
AoA setup		Setup 1 in clause A.3.15.		Setup 1 in clause A.3.15.	
Assumption for UE beams Note 8		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-94.03	-94.03	-94.03	-94.03
N_{oc} Note1	dBm/SCS Note 3	-85.0	-85.0	-85.0	-85.0
$\hat{E}_s/N_{oc}$	dB	-1.75		-1.75	
SSB_RP Note2	dBm/SCS Note4	-86.75	-86.75	-88	-88
SS-RSRQ Note2	dB	-14.75	-14.75	-15.56	-15.56
$\hat{E}_s/I_{ot}$	dB	-1.75	-1.75	-3	-3
Io Note2	dBm/95.04 MHz Note4	-53.8	-53.8	-54.25	-54.25
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRQ, SSB_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: Void Note 7: Void Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.7.7.3 SS-SINR

A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. . The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		Freq2		Freq2	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		66		66	
Downlink initial BWP configuration		DLBWP.0.1			
Downlink dedicated BWP configuration		DLBWP.1.1			
Uplink initial BWP configuration		ULBWP.0.1			
Uplink dedicated BWP configuration		ULBWP.1.1			
DRX cycle configuration	ms	Not applicable			
TRS configuration		TRS.2.1 TDD			
TCI state		TCI.State.0			
PDSCH Reference measurement channel		SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	
Dedicated RMSI CORESET Reference Channel		CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC.1			
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
SS-RSSI-Measurement		Not Applicable			
EPRE ratio of PSS to SSS	dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS[Note 1]					
EPRE ratio of OCNG to OCNG DMRS [Note 1]					
Propagation conditions		AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void					

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Test 1		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		Setup 1 according to clause A.3.15.1	
Assumption for UE beams[Note 9]		Rough		Rough	
N_{oc} [Note1]	dBm/15kHz [Note4]	-105		-105	
N_{oc} [Note1]	dBm/SCS [Note3]	-96		-96	
$\hat{E}_s/N_{oc}$	dB	4.54		2.66	
SSB_RP[Note2]	dBm/SCS	-91.46	-93.34	-99	-99

	Note4				
SS-SINR Note2	dB	0	-3.2	-4.76	-4.76
$\hat{E}_s/I_{ot}$	dB	0	-3.2	-4.76	-4.76
Io Note2	dBm/95.04 MHz Note4	-59.2		-64	
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-SINR, SSB_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 6: Void Note 7: Void Note 8: Void Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1.

A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TDD		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Data RBs allocated		66		66		66	
Downlink initial BWP configuration		DLBWP.0.1					
Downlink dedicated BWP configuration		DLBWP.1.1					
Uplink initial BWP configuration		ULBWP.0.1					
Uplink dedicated BWP configuration		ULBWP.1.1					
DRX cycle configuration	ms	Not applicable					
TRS configuration		TRS.2.1 TDD					
TCI state		TCI.State.0					
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2	SMTC.1 FR2	SMTC.1 FR2	SMTC.1 FR2	SMTC.1 FR2
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1	dB	0	0	0	0	0	0
Propagation conditions		AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void							

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration	degrees	Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1	
Assumption for UE beams Note 10		Rough		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
N_{oc} Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
$\hat{E}_s/N_{oc}$	dB	-0.5		-0.5		11.0	
SSB_RP Note2	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR Note2	dB	-0.5	-0.5	11	11	-3.0	-3.0
$\hat{E}_s/I_{ot}$	dB	-0.5	-0.5	11	11	-3.0	-3.0
Io Note2	dBm/95.04 MHz Note4	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SS-SINR, SSB_RP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6: Void
Note 7: Void
Note 8: Void
Note 9: Void
Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.7.7.4 L1-RSRP measurement for beam reporting

A.7.7.4.1 SSB based L1-RSRP measurement

A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.7.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.7.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	1~2	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
Data RBs allocated	1~2		66	66
PDSCH Reference measurement channel	1		SR.3.2 TDD	SR.3.2 TDD
	2		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
	2		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
	2		CCR.3.7 TDD	CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot320	slot320
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS	1~2	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2 NOTE 3	
			SSB0	SSB1	SSB0	SSB1
Angle of arrival configuration			Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1	
Assumption for UE beams Note 4			Rough		Rough	
N_{oc}	1~2	dBm/15 kHz	-100		n.a.	
N_{oc}	1	dBm/SS B SCS	-91		n.a.	
	2		-88		n.a.	
$\hat{E}_s/I_{ot}$	1~2	dB	10	-2	n.a.	
SSB_RP Note1	1	dBm/SC S	-81	-93	As in Table B.2.4-2	
	2		-78	-90	As in Table B.2.4-2	
Io Note1	1~2	dBm/ 95.04M Hz	-51.57		SSB_RP+28.98	
$\hat{E}_s/N_{oc}$	1~2	dB	10	-2	n.a.	
Note 1: SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 2: Void Note 3: No additional noise is added by the test system in Test 2. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, , the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0 and absolute accuracy of SSB1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

For Test 2:

Absolute accuracy of SSB0 and absolute accuracy of SSB1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.7.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
SSB0	SSB_RP0 -δ + G_{min} ≤ Reported RSRP(dBm) ≤ SSB_RP0 +δ + G_{max}
SSB1	SSB_RP1 -δ + G_{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ + G_{max}
Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.1.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.7.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD Configuration	1		TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1		OP.1	OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
TRS Configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2	TCI.State.2
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1		periodic	periodic
reportQuantity	1		cri-RSRP	cri-RSRP
Number of reported RS	1		2	2
L1-RSRP reporting period	1		slot80	slot80
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
EPRE ratio of PSS to SSS	1	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS[Note 1]				
EPRE ratio of OCNG to OCNG DMRS [Note 1]				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2 NOTE 3	
			CSI-RS0	CSI-RS1	CSI-RS0	CSI-RS1
Angle of arrival configuration			Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1	
Assumption for UE beams Note 4			Rough		Rough	
N_{oc}	1~2	dBm/15 kHz	-100		n.a.	
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.	
$\hat{E}_s/I_{ot}$	1~2	dB	10	-2	n.a.	
CSI-RS-RSRP Note1	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2	
Io Note1	1~2	dBm/ 95.04M Hz	-59.86		SS-RSRP+28.98	
$\hat{E}_s/N_{oc}$	1~2	dB	-51.57	-2	n.a.	

Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 3: No additional noise is added by the test system in Test 2.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

For Test 2:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
CSI-RS0	CSI-RS _RP0 -δ + G_{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 +δ + G_{max}
CSI-RS1	CSI-RS _RP1 -δ + G_{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 +δ + G_{max}
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.5 CLI measurements

A.7.7.5.1 SA SRS-RSRP measurement accuracy with FR2 serving cell

A.7.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.22.1.1 with the testing configurations for NR cells in Table A.7.7.5.1.1-1.

Table A.7.7.5.1.1-1: Applicable NR configurations for FR2 SRS-RSRP accuracy test

Config	Description
1	120 kHz SRS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.7.7.5.1.2 Test parameters

In this set of test cases there is one cell in the test, FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.5.1.2-1 and A.7.7.5.1.2-2 below. The test parameter for the (virtual) neighbor cell UE transmitting SRS are given in Table A.7.7.5.1.2-2.

Before the test UE is configured to perform SRS-RSRP measurement. During the test, the test system transmits SRS resources for measurement in the DL slots according to the SRS configuration in Table A.7.7.5.1.2-3. There is no measurement gap configured in the test. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on SRS symbol to be transmitted and on 2 data symbols before SRS to be transmitted.

Table A.7.7.5.1.2-1: FR2 test parameters for SRS-RSRP accuracy

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD configuration	1		TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.3 FR2	SSB.3 FR2
OCNG Patterns	1		OP.1	OP.1
TRS configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
SMTC configuration	1		SMTC.1	SMTC.1
Time offset between DL from serving cell and SRS from test system	1	μs	10.76	10.67
EPRE ratio of PSS to SSS	1	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.				

Table A.7.7.5.1.2-2: SRS-RSRP accuracy OTA related test parameters for PCell and Neighbour cell UE in FR2

Parameter	Unit	T1	T2
Angle of arrival configuration		Setup 1 defined A.3.15.1	Setup 1 defined A.3.15.1
Beam assumption Note 5		Fine	Fine
N_{oc} Note1	dBm/15kHz Note3	-100	N/A
N_{oc} Note1	dBm/SCS Note3	-91	N/A
$\hat{E}_s/N_{oc}$	dB	2	N/A
E_s	dBm/SCS Note3		(Table B.2.7-2 Rx Beam Peak)
SRS_RP Note2	dBm/SCS	-89	(Table B.2.7-2 Rx Beam Peak)
$\hat{E}_s/I_{ot\ BB}$ Note4	dB	>1	1
Io Note2	dBm/95.04 MHz Note3	-57.89	(Table B.2.7-2 Rx Beam Peak +50.79dB)

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SRS_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 2dB for UE multi-band relaxation factor $\sum MB_P$ from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Table A.7.7.5.1.2-3: SRS configuration parameters for FR2 SRS-RSRP accuracy

	Field	SRSConf.1
SRS-ResourceSet	srs-ResourceSetId	0
	srs-ResourceIdList	0
	resourceType	Periodic
	Usage	Codebook
SRS-Resource	SRS-ResourceId	0
	nrofSRS-Ports	Port1
	transmissionComb	n2
	combOffset-n2	0
	cyclicShift-n2	0
	resourceMapping startPosition	0
	resourceMapping nrofSymbols	n1
	resourceMapping repetitionFactor	n1
	freqDomainPosition	0
	freqDomainShift	0
	freqHopping c-SRS	12
	freqHopping b-SRS	0
	freqHopping b-hop	0
	groupOrSequenceHopping	Neither
	resourceType	Periodic
	periodicityAndOffset-p	sl160,25
	sequenceId	0

A.7.7.5.1.3 Test Requirements

The SRS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.22.1.1. The following requirements are to be verified:

During T1:

The UE is deemed to meet the requirement if the reported SRS-RSRP is in the range shown in table A.7.7.5.1.3-1.

During T2:

The UE is deemed to meet the requirement if the reported SRS-RSRP is in the range shown in table A.7.7.5.1.3-1.

Table A.7.7.5.1.3-1: SRS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
SRS	SRS_RP -δ +G_{min} ≤ Reported SRS-RSRP(dBm) ≤SRS_RP +δ +G_{max}
Note 1: SRS_RP is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.22.1.1-2, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.5.2 SA CLI-RSSI measurement accuracy with FR2 serving cell

A.7.7.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CLI-RSSI measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.22.2.1 with the testing configurations for NR cells in Table A.7.7.5.2.1-1.

Table A.7.7.5.2.1-1: Applicable NR configurations for FR2 CLI-RSSI accuracy test

Config	Description
1	120 kHz SRS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.7.7.5.2.2 Test parameters

In this set of test cases there is one cell in the test, FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.5.2.2-1 and A.7.7.5.2.2-2 below.

Before the test UE is configured to perform CLI-RSSI measurement. There is no measurement gap configured in the test. During the test, the test system does not transmit PDCCH/PDSCH/OCNG on symbols for CLI-RSSI resource and on 2 data symbol before. The CLI-RSSI measurement resource configuration is in Table A.7.7.5.2.2-3.

Table A.7.7.5.2.2-1: FR2 test parameters for CLI-RSSI accuracy

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD configuration	1		TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.3 FR2	SSB.3 FR2
OCNG Patterns Note2	1		OP.1	OP.1
TRS configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
SMTC configuration	1		SMTC.1	SMTC.1
Time offset between DL from serving cell and OCNG from test system	1	µs	10.67	10.67
EPRE ratio of PSS to SSS	1	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: OCNG is not transmitted in the CLI-RSSI measurement resources.				

Table A.7.7.5.2.2-2: CLI-RSSI accuracy OTA related test parameters

Parameter	Unit	T1	T2
Angle of arrival configuration		Setup 1 defined A.3.15.1	
Beam assumption Note 5		Fine	
N_{oc} on CLI-RSSI measurement resource Note1	dBm/15kHz Note3	-100	
N_{oc} on CLI-RSSI measurement resource Note1	dBm/SCS Note3	-91	
$\hat{E}_s/N_{oc}$ on CLI-RSSI measurement resource	dB	-Infinity	
RSRP on CLI-RSSI measurement resource Note2	dBm/SCS	-Infinity	
$\hat{E}_s/I_{ot\ BB}$ on CLI-RSSI measurement resource Note4	dB	-Infinity	
Io on CLI-RSSI measurement resource Note2	dBm/95.04 MHz Note3	-62.01	
Io on CLI-RSSI measurement resource Note2	dBm/1.08 MHz	-81.46	
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SRS_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 2dB for UE multi-band relaxation factor $\sum MB_P$ from TS 38.101-2 [19] Table 6.2.1.3-4. Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.			

Table A.7.7.5.2.2-3: CLI-RSSI measurement resource configuration for FR2 CLI-RSSI accuracy

	Field	SRSConf.1
CLI-RSSI measurement resource	rssi-ResourceId	0
	rssi-SCS	120kHz
	startPRB	0
	nrofPRBs	66
	startPosition	3
	nrofSymbols	11
	rssi-PeriodicityAndOffset	sl160, 25

A.7.7.5.2.3 Test Requirements

The CLI-RSSI measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.22.2.1. The following requirements are to be verified:

During T1:

The UE is deemed to meet the requirement if the reported CLI-RSSI is in the range shown in table A.7.7.5.2.3-1.

During T2:

The UE is deemed to meet the requirement if the reported CLI-RSSI is in the range shown in table A.7.7.5.2.3-1.

Table A.7.7.5.2.3-1: CLI-RSSI absolute accuracy test requirement

	Test requirement Notes1,2,3
	Io -δ +G_{min} ≤ Reported CLI-RSSI(dBm) ≤Io +δ +G_{max}
Note 1: Io is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for 1.08MHz Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.22.1.1-2, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.6 L1-SINR measurement for beam reporting

A.7.7.6.1 L1-SINR measurement with CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off

A.7.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.8.4.1 and clause 10.1.28.1 for L1-SINR measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.6.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.6.1.1-1: Applicable NR configurations for FR2 L1-SINR test with CSI-RS based CMR and no dedicated IMR configured

Config	**Description**
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.6.1.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.1.2-1 and Table A.7.7.6.1.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.1.2-1 and Table A.7.7.6.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.6.1.2-1: FR2 CSI-RS based L1-SINR general test parameters

Parameter	Config	Unit	Test 1
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
SMTC configuration	1		SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD
reportConfigType	1		periodic
reportQuantity	1		cri-SINR-r16
nrofReportedRS	1		2
L1-SINR reporting period	1		slot80
Propagation condition	1		AWGN
Antenna configuration	1		1x2
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS[Note 1]			
EPRE ratio of OCNG to OCNG DMRS [Note 1]			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			

Table A.7.7.6.1.2-2: FR2 CSI-RS based L1-SINR OTA related test parameters

Parameter	Config	Unit	Test 1	
			CSI-RS0	CSI-RS1
Angle of arrival configuration			Setup 1 according to A.3.15.1	
Assumption for UE beams[Note 4]			Rough	
N_{oc}	1~2	dBm/15 kHz	-100	
N_{oc}	1~2	dBm/SSB SCS	-91	
$\hat{E}_s/I_{ot}$	1~2	dB	10	-2
CSI-RS-RSRP[Note1]	1~2	dBm/SCS	-81	-93
Io[Note1]	1~2	dBm/ 95.04MHz	-59.86	
$\hat{E}_s/N_{oc}$	1~2	dB	10	-2
Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 3: Void. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.7.6.1.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clauses 10.1.28.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.1.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.1.2-1.

Table A.7.7.6.1.3-1: L1-SINR absolute accuracy test requirement

	Test requirement [Notes1,2]
CSI-RS0	L1-SINR0-δ≤ Reported SINR(dB) ≤L1-SINR0+δ
CSI-RS1	L1-SINR1-δ ≤ Reported SINR(dB) ≤L1-SINR1+δ
Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-1, selected according to the Io used in the test	

A.7.7.6.2 L1-SINR measurement with SSB based CMR and dedicated IMR

A.7.7.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.8.4.2 and clause 10.1.28.2 for L1-SINR measurements with SSB based CMR and CSI-IM based IMR, with the testing configurations for NR cells in Table A.7.7.6.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.6.2.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with SSB based CMR and CSI-IM based IMR

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.7.7.6.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.2.2-1 and Table A.7.7.6.2.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources and one CSI-IM resource set with two CSI-IM resource. UE is configured to perform RLM and BFD measurement based on the SSB resources 0 and 1. UE is configured to perform L1-SINR measurement based on the SSBs as CMR and the CSI-IM resources as IMR.

Table A.7.7.6.2.2-1: FR2 L1-SINR general test parameters with SSB based CMR and CSI-IM based IMR

Parameter	Config	Unit	Test 1
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
$BW_{channel}$	1~2	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
	2		SSB.2 FR2
CSI-IM configuration	1~2		CSI-IM 3.1 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
SMTC configuration	1~2		SMTC.1
reportConfigType	1~2		periodic
reportQuantity-r16	1~2		ssb-Index-SINR-r16
Number of reported RS	1~2		2
L1-SINR reporting period	1~2		slot640
Propagation condition	1~2		AWGN
Antenna configuration	1~2		1x2
EPRE ratio of PSS to SSS	1~2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			

Table A.7.7.6.2.2-2: FR2 L1-SINR SSB specific test parameters

Parameter	Config	Unit	Test 1	
			SSB0	SSB1
Angle of arrival configuration			Setup 1 according to A.3.15.1	
Assumption for UE beams[Note 4]			Rough	
N_{oc}	1~2	dBm/15kHz	-100	
N_{oc}	1	dBm/SSB SCS	-91	
	2		-88	
$\hat{E}_s/I_{ot}$	1~2	dB	10	-2
SS-RSRP[Note1]	1	dBm/SCS	-81	-93
	2		-78	-90
Io[Note1]	1~2	dBm/95.04 MHz	-51.57	
$\hat{E}_s/N_{oc}$	1~2	dB	10	-2
Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.7.7.6.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for SSB#0+CSI-IM#0 and SSB#1+CSI-IM#1 of Cell 1 shall fulfil the requirements in clauses 10.1.28.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB#0+CSI-IM#0 and absolute accuracy of SSB#1+CSI-IM#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.2.3-1.

Relative accuracy of SSB#0+CSI-IM#0 compared with SSB#1+CSI-IM#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.2.2-2.

Table A.7.7.6.2.3-1: L1-SINR absolute accuracy test requirement

	Test requirement [Notes1,2]
SSB#0+CSI-IM#0	L1_SINR0 -δ ≤ Reported SINR(dB) ≤ L1_SINR0 +δ
SSB#1+CSI-IM#1	L1_SINR1 -δ ≤ Reported SINR(dB) ≤ L1_SINR1 +δ
Note 1: L1_SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB#n+CSI-IM#n under consideration Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.2.1-2, selected according to the Io used in the test	

A.7.7.6.3 L1-SINR measurement with CSI-RS based CMR and dedicated IMR

A.7.7.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-SINR measurement accuracy is within the specified limits. This test will partly verify the requirements in Clauses 9.8.4.3 and clause 10.1.28.3 for L1-SINR measurements based on CSI-RS as both CMR and IMR with the testing configurations for NR cell in Table A.7.7.6.3.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.6.3.1-1: Applicable NR configurations for FR2 L1-SINR measurement test with CSI-RS based both CMR based IMR

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.6.3.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.6.3.2-1 and Table A.7.7.6.3.2-2 below. The absolute and relative accuracy of L1-SINR measurements are tested by using the parameters in Table A.7.7.6.3.2-1 and Table A.7.7.6.3.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured two CSI-RS resource sets with two CSI-RS resources for each set. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB. UE is configured to perform L1-SINR measurement based on the configured CSI-RS as both CMR and IMR.

Table A.7.7.6.3.2-1: FR2 L1-SINR measurement test with CSI-RS based both CMR and IMR

Parameter	Config	Unit	Test 1
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
$BW_{channel}$	1	MHz	100: $N_{RB,c}$ = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
SMTC configuration	1		SMTC.1
CSI-RS configuration as CMR	1		CSI-RS.3.2 TDD
CSI-RS configuration as IMR	1		CSI-RS.3.3A TDD
reportConfigType	1		periodic
reportQuantity-r16	1		cri-SINR-r16
nrofReportedRS	1		2
L1-RSRP reporting period	1		slot80
Propagation condition	1		AWGN
Antenna configuration	1		1x2
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			

Table A.7.7.6.3.2-2: FR2 CSI-RS based L1-SINR measurement OTA related test parameters

Parameter	Config	Unit	Test 1	
			CSI-RS0	CSI-RS1
Angle of arrival configuration			Setup 1 according to A.3.15.1	
Assumption for UE beams Note 4			Rough	
N_{oc}	1~2	dBm/15 kHz	-100	
N_{oc}	1~2	dBm/SSB SCS	-91	
$\hat{E}_s/I_{ot}$	1~2	dB	10	0
CSI-RS-RSRP Note1	1~2	dBm/SCS	-81	-91
Io Note1	1~2	dBm/ 95.04MHz	-59.86	
$\hat{E}_s/N_{oc}$	1~2	dB	10	0

Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 3: No additional noise is added by the test system in Test 2.
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.6.3.3 Test Requirements

After 640ms from the beginning of the test, the L1-SINR measurement accuracy for CSI-RS#0+CSI-RS#2 and CSI-RS#1+CSI-RS#3 of Cell 1 shall fulfil the requirements in clause 10.1.28.3. The following requirements are to be verified:

Absolute accuracy of CSI-RS#0 and absolute accuracy of CSI-RS#1. The UE is deemed to meet the requirement if the reported L1-SINR is in the range shown in Table A.7.7.6.3.3-1.

Relative accuracy of CSI-RS#0 compared with CSI-RS#1. The UE is deemed to meet the requirement if the difference in reported L1-SINR meets the requirements in Table 10.1.28.3.2-1.

Table A.7.7.6.3.3-1: L1-SINR absolute accuracy test requirement

	Test requirement Notes1,2
CSI-RS#0	L1-SINR0 -δ≤ Reported SINR(dBm) ≤L1-SINR 0 +δ
CSI-RS#1	L1-SINR 1 -δ≤ Reported SINR(dBm) ≤L1-SINR 1 +δ

Note 1: L1-SINRn is the equivalent SINR received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS#n under consideration
Note 2: δ is the SINR absolute accuracy requirement from Table 10.1.28.3.1-1.

A.7.7.7 CSI-RSRP

A.7.7.7.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.2.1 and 10.1.3.2.2 for intra-frequency measurements.

A.7.7.7.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.7.1.2-1. Both absolute and relative accuracy of CSI-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.7.1.2-2 and A.7.7.7.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.7.1.2-1: CSI-RSRP Intra frequency CSI-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.7.1.2-2: CSI-RSRP Intra frequency general test parameters

Parameter	Unit	T1		T2	
		Cell 1	Cell 2	Cell 1	Cell 2
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 24		100: $N_{RB,c}$ = 24	
Downlink initial BWP configuration		DLBWP.0.1	-	DLBWP.0.1	-
Downlink dedicated BWP configuration		DLBWP.1.1	-	DLBWP.1.1	-
Uplink initial BWP configuration		ULBWP.0.1	-	ULBWP.0.1	-
Uplink dedicated BWP configuration		ULBWP.1.1	-	ULBWP.1.1	-
DRX cycle configuration		Not applicable	-	Not applicable	-
TRS configuration		TRS.2.1 TDD	-	TRS.2.1 TDD	-
TCI state		TCI.State.0	-	TCI.State.0	-
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
Control channel RMC		CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns		OP.3	OP.3	OP.3	OP.3
SMTC configuration		SMTC.1		SMTC.1	
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
CSI-RS configuration for RRM		CSI-RS.RRM.FR2.1 TDD			
Time offset with Cell 1	µs	-	0.58	-	0.58
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS[Note 1]					

EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.					

Table A.7.7.7.1.2-3: CSI-RSRP Intra frequency OTA related test parameters

Parameter	Unit	T1		T2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1			
Assumption for UE beams Note 7		Rough		Assumption for UE beams Note 7	
N_{oc} Note1	dBm/15kHz Note4	-91.6		N/A	
N_{oc} Note1	dBm/SCS Note4	-82.6		N/A	
$\hat{E}_s/N_{oc}$	dB	6.0	1.0	N/A	N/A
E_s	dBm/SCS Note4			(Table B.2.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2.2-2 Rx Beam Peak +2.1dB)
CSI-RS_RP Note2	dBm/SCS	-76.6	-81.6	(Table B.2.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2.2-2 Rx Beam Peak +2.1dB)
$\hat{E}_s/I_{ot\ BB}$ Note6	dB	2.44	-5.98	-5.98	-5.98
Io Note2	dBm/95.04 MHz Note4	-50.05		(Table B.2.2.2-2 Rx Beam Peak +29.70dB)	
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: CSI-RS_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: Void Note 6: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4. Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.7.1.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.2.1 and relative accuracy requirements in clause 10.1.3.2.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.7.7.7.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in table A.7.7.7.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in Table 10.1.3.2.2-1.

Table A.7.7.7.1.3-1: CSI-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
Cell 1	CSI-RS_RP1 $-\delta + G_{min} \leq$ Reported RSRP(dBm) $\leq$ CSI-RS_RP1 $+\delta + G_{max}$
Cell 2	CSI-RS_RP2 $-\delta + G_{min} \leq$ Reported RSRP(dBm) $\leq$ CSI-RS_RP2 $+\delta + G_{max}$
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.2.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.7.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.7.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.2.1 and 10.1.5.2.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.7.2.1-1.

Table A.7.7.7.2.1-1: Applicable NR configurations for FR2 inter-frequency CSI-RSRP accuracy test

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.7.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.7.2.2-1 and Table A.7.7.7.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.7.2.2-1 and Table A.7.7.7.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.7.2.2-1: CSI-RSRP inter-frequency test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
$BW_{channel}$			100: $N_{RB,c}$ = 24		100: $N_{RB,c}$ = 24	
Gap pattern ID			0		0	
Duplex mode			TDD	TDD	TDD	TDD
TDD configuration			TDDConf.3.1		TDDConf.3.1	
PDSCH Reference measurement channel			SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel			CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated CORESET Reference Channel			CCR.3.1 TDD	-	CCR.3.1 TDD	-
SSB configuration			SSB.3 FR2		SSB.3 FR2	
SMTC configuration			SMTC.1		SMTC.1	
OCNG Patterns			OP.3		OP.3	
Initial BWP Configuration			DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration			DLBWP.1.3 ULBWP.1.3		DLBWP.1.3 ULBWP.1.3	
TRS Configuration			TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration			TCI.State.2		TCI.State.2	
CSI-RS configuration for RRM			CSI-RS.RRM.FR2.1 TDD		CSI-RS.RRM.FR2.1 TDD	
Time offset between Cell 2 and Cell 3		μs	0.58		0.58	
EPRE ratio of PSS to SSS		dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition		-	AWGN	AWGN	AWGN	AWGN
Antenna configuration		-	1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.						

Table A.7.7.7.2.2-2: SS-RSRP inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 4b according to clause A.3.15.4.2		Setup 4b according to clause A.3.15.4.2	
		AoA1 Spherical coverage	AoA2 Rx Beam Peak	AoA1 Spherical coverage	AoA2 Rx Beam Peak
N_{oc} Note1	dBm/15kHz Note4	-90.6	-90.6	(Table B.2.3.2-2 Rx Beam Peak +1.97dB)	(Table B.2.3.2-2 Rx Beam Peak - 3.03dB)
Assumption for UE beams Note 7		Rough		Rough	
N_{oc} Note1	dBm/SCS Note4	-81.6	-81.6	(Table B.2.3.2-2 Rx Beam Peak +11.0dB)	(Table B.2.3.2-2 Rx Beam Peak +6.0dB)
$\hat{E}_s/N_{oc}$	dB	6.0	6.0	17.0	-1.0
CSI-RS_RP Note2	dBm/SCS	-75.60	-75.60	(Table B.2.3.2-2 Rx Beam Peak +28.0dB)	(Table B.2.3.2-2 Rx Beam Peak +5.0dB)
($CSI\text{-}RS\_RP_{Cell\ 1}$ – $CSI\text{-}RS\_RP_{Cell\ 2}$)	dB	0		23.00	
$\hat{E}_s/I_{ot\ BB}$ Note6	dB	5.29	5.96	8.86	-3.92
Io Note2	dBm/95.04 MHz Note4	-50.03	-50.03	(Table B.2.3.2-2 Rx Beam Peak +52.68dB)	(Table B.2.3.2-2 Rx Beam Peak +33.13dB)
($Io_{freq\ 1}$ – $Io_{freq\ 2}$)	dB	0		19.55	

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: CSI-RS_RP, Es/Iot, Io, ($CSI\text{-}RS\_RP_{Cell\ 2}$ – $CSI\text{-}RS\_RP_{Cell\ 1}$) and ($Io_{freq\ 2}$ – $Io_{freq\ 1}$) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: Void

Note 6: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P or ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.7.2.3 Test Requirements

The CSI-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.2.1 and the relative requirements in clause 10.1.5.2.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.7.7.7.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in A.7.7.7.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported CSI-RSRP is in the range shown in Table A.7.7.7.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported CSI-RSRP meets the requirements in A.7.7.7.2.3-2.

Table A.7.7.7.2.3-1: CSI-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3,4
Cell 1	CSI-RS_RP1 -δ +G_{min} +X ≤ Reported RSRP(dBm) ≤ CSI-RS_RP1 +δ +G_{max}
Cell 2	CSI-RS_RP2 -δ +G_{min} ≤ Reported RSRP(dBm) ≤ CSI-RS_RP2 +δ +G_{max}
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.2.1-1, selected according to the Io used in the test Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.	

Table A.7.7.7.2.3-2: CSI-RSRP relative accuracy test requirement

	Test requirement Notes1,2,3,4
Cell 2 – Cell 1	CSI-RS_RP2 – CSI-RS_RP1 -δ ≤ Reported RSRP(dB) ≤ CSI-RS_RP2 – CSI-RS_RP1 +δ –(X)
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.2.2-1 Note 3: Void Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.	

A.7.7.8 CSI-RSRQ

A.7.7.8.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.2.1.

A.7.7.8.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.8.1.2-1. The absolute accuracy of CSI-RSRQ intra-frequency measurement is tested by using the parameters in Table A.7.7.8.1.2-2 and Table A.7.7.8.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.8.1.2-1: CSI-RSRQ Intra frequency CSI-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.8.1.2-2: CSI-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			Freq1		Freq1	
Duplex mode			TDD		TDD	
TDD configuration			TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$		MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
TRS configuration			TRS.2.1 TDD		TRS.2.1 TDD	
TCI state			TCI.State.0		TCI.State.0	
PDSCH Reference measurement channel			SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET Reference Channel			CR.3.1 TDD	-	CR.3.1 TDD	
Control channel RMC			CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns			OP.1	OP.1	OP.1	OP.1
Time offset with Cell 1		µs	-	0.58	-	0.58
SMTC configuration			SMTC.1			
SSB configuration			SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
PDSCH/PDCCH subcarrier spacing		kHz	120	120	120	120
CSI-RS configuration for RRM			CSI-RS.RRM.FR2.1 TDD			
EPRE ratio of CSI-RS to SSS		dB	0	0	0	0
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS Note 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
$\hat{E}_s / N_{oc}$		dB	3	3	-3	-3
Propagation condition			AWGN		AWGN	
Antenna configuration			1x2		1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Table A.7.7.8.1.2-3: CSI-RSRQ Intra frequency OTA related test parameters

	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		Setup 1according to clause A.3.15.1	
Assumption for UE beams[Note 9]		Rough			
N_{oc} Note1	dBm/15kHz[Note 4]	-95		-95	
N_{oc} Note1	dBm/SCS[Note3]	-86		-86	
CSI-RSRP[Note2]	dBm/SCS [Note4]	-83	-83	-89	-89
CSI-RSRQ [Note2]	dB	-14.77	-14.77	-16.81	-16.81
$\hat{E}_s/I_{ot}$	dB	-1.76	-1.76	-4.76	-4.76
Io[Note2]	dBm/95.04 MHz [Note4]	-50		-54	-54
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Clause 3.5.2. Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.8.1.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+2.5 dB to Nominal CSI-RSRQ-3.5 dB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ+3.5 dB to Nominal CSI-RSRQ-4.5 dB according to the requirements in clause 10.1.8.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal RSRQ is the value shown in table A.7.7.8.1.2-3.

A.7.7.8.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.8.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.10.2.1 and 10.1.10.2.2 for inter-frequency measurement.

A.7.7.8.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.8.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.8.2.2-2 and Table A.7.7.8.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A. 7.7.8.2.2-1: CSI-RSRQ Inter frequency supported test configurations

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.8.2.2-2: CSI-RSRQ Inter frequency general test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		Freq1	freq2	freq1	Freq2
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
Time offset with Cell 1	μs	-	0.58	-	0.58
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2
CSI-RS configuration for RRM		CSI-RS.RRM.FR2.1 TDD			
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSS[Note 1] EPRE ratio of CSI-RS to SSS	dB	0	0	0	0
$\hat{E}_s / N_{oc}$	dB	-1.75	-1.75	-3	-1.75
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					

Table A.7.7.8.2.2-3: CSI-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
AoA setup		Setup 1 in clause A.3.15.		Setup 1 in clause A.3.15.	
Assumption for UE beams Note 8		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-94.03		-94.03	
N_{oc} Note1	dBm/SCS Note 3	-85.0		-85.0	
CSI-RSRP Note2	dBm/SCS Note4	-86.75	-86.75	-88	-88
CSI-RSRQ Note2	dB	-14.75	-14.75	-15.56	-15.56
$\hat{E}_s/I_{ot}$	dB	-1.75	-1.75	-3	-3
Io Note2	dBm/95.04 MHz Note4	-53.8	-53.8	-54.25	-54.25

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: CSI-RSRQ, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: CSI-RSRQ and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.8.2.3 Test Requirements

The CSI-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal CSI-RSRQ+2.5dB to Nominal CSI-RSRQ -3.5dB and the CSI-RSRQ measurement accuracy in test 2 shall be within the range Nominal CSI-RSRQ +3.5dB to Nominal CSI-RSRQ -4.5dB according to the requirements in clause 10.1.10.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The CSI-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.2.2.

A.7.7.9 CSI-SINR

A.7.7.9.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.2.1.

A.7.7.9.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.9.1.2-1. . The absolute accuracy of CSI-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.9.1.2-2 and Table A.7.7.9.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.9.1.2-1: CSI-SINR Intra frequency CSI-SINR supported test configurations

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.9.1.2-2: CSI-SINR Intra frequency test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		Freq2		Freq2	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Downlink initial BWP configuration		DLBWP.0.1			
Downlink dedicated BWP configuration		DLBWP.1.1			
Uplink initial BWP configuration		ULBWP.0.1			
Uplink dedicated BWP configuration		ULBWP.1.1			
DRX cycle configuration	ms	Not applicable			
TRS configuration		TRS.2.1 TDD			
TCI state		TCI.State.0			
PDSCH Reference measurement channel		SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	
Dedicated RMSI CORESET Reference Channel		CCR.3 .1 TDD	-	CCR.3. 1 TDD	-
Time offset with Cell 1	µs	-	0.29	-	0.29
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC.1			
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
CSI-RS configuration for RRM		CSI-RS.RRM.FR2.1 TDD			
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
SS-RSSI-Measurement		Not Applicable			
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of CSI-RS to SSS EPRE ratio of OCNG to SSS[Note 1]	dB	0	0	0	0
$\hat{E}_s / N_{oc}$	dB	4.54	2.66	-3	-3
Propagation conditions		AWGN			
Antenna configuration		1x2			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.					

Table A.7.7.9.1.2-3: CSI-SINR Intra frequency OTA related test parameters

Parameter	Unit	Test 1		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		Setup 1 according to clause A.3.15.1	
Assumption for UE beams Note 9		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-105		-105	
N_{oc} Note1	dBm/SCS Note3	-96		-96	
CSI-RSRP Note2	dBm/SCS Note4	-91.46	-93.34	-99	-99
CSI-SINR Note2	dB	0	-3.2	-4.76	-4.76
$\hat{E}_s/I_{ot}$	dB	0	-3.2	-4.76	-4.76
Io Note2	dBm/95.04 MHz Note4	-59.2		-64	
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in clause 3.5.2. Note 7: Void Note 8: Void Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.9.1.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR+XdB to Nominal CSI-SINR –X-1dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +YdB to Nominal CSI-SINR –Y-1dB according to the requirements in clause 10.1.13.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. The relative CSI-SINR measurement accuracy shall fulfil the requirements in clause 10.1.13.2.1.

Editor’s note: The values of X and Y are pending on the accuracy requirement discussion

A.7.7.9.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.9.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.2.1 and 10.1.15.2.2 for inter-frequency measurement.

A.7.7.9.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.9.2.2-1. Both absolute accuracy and relative accuracy requirements of CSI-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.9.2.2-2 and Table A.7.7.9.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.9.2.2-1: CSI-SINR Inter frequency CSI-SINR supported test configurations

Configuration	Description
1	120 kHz SSB and CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.9.2.2-2: CSI-SINR Inter frequency general test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TDD		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Downlink initial BWP configuration		DLBWP.0.1					
Downlink dedicated BWP configuration		DLBWP.1.1					
Uplink initial BWP configuration		ULBWP.0.1					
Uplink dedicated BWP configuration		ULBWP.1.1					
DRX cycle configuration	ms	Not applicable					
TRS configuration		TRS.2.1 TDD					
TCI state		TCI.State.0					
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
Time offset with Cell 1	µs	-	0.29	-	0.29	-	0.29
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2
CSI-RS configuration for RRM		CSI-RS.RRM.FR2.1 TDD					
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG to SSS Note 1	dB	0	0	0	0	0	0
$\hat{E}_s/N_{oc}$	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0
Propagation conditions		AWGN					
Antenna configuration		1x2					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: CSI-SINR, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.7.7.9.2.2-3: CSI-SINR Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration	degrees	Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1	
Assumption for UE beams Note 10		Rough		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-105		-105		-105	
N_{oc} Note1	dBm/SCS Note3	-96		-96		-96	
CSI-RSRP Note2	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
CSI-SINR Note2	dB	-0.5	-0.5	11	11	-3.0	-3.0
$\hat{E}_s/I_{ot}$	dB	-0.5	-0.5	11	11	-3.0	-3.0
Io Note2	dBm/95.04 MHz Note4	-69.3		-55.4		-65.24	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: CSI-SINR, CSI-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: CSI-SINR and CSI-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6: NR operating band groups are as defined in clause 3.5.2.
Note 7: Void
Note 8: Void
Note 9: Void
Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.9.2.3 Test Requirements

The CSI-SINR absolute measurement accuracy in test 1 shall be within the range Nominal CSI-SINR +XdB to Nominal CSI-SINR –X-1dB and the CSI-SINR measurement accuracy in test 2 shall be within the range Nominal CSI-SINR +YdB to Nominal CSI-SINR –Y-1dB according to the requirements in clause 10.1.15.2.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The CSI-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.2.2.

A.7.7.10 RSTD measurements

A.7.7.10.1 RSTD measurement accuracy test case for single positioning frequency layer

A.7.7.10.1.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions.

The supported test configurations are specified in Table A.7.7.10.1.1-1.

Table A.7.7.10.1.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell. Cell 2 is a neighbour cells. Both cells are on the same NR RF channel in FR2. GP#13 is configured for the test. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9.2.

Table A.7.7.10.1.1-2: RSTD accuracy test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
PRS ARFCN		freq1		freq1	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Downlink initial BWP configuration		DLBWP.0.1	-	DLBWP.0.1	-
Downlink dedicated BWP configuration		DLBWP.1.1	-	DLBWP.1.1	-
Uplink initial BWP configuration		ULBWP.0.1	-	ULBWP.0.1	-
Uplink dedicated BWP configuration		ULBWP.1.1	-	ULBWP.1.1	-
DRX cycle configuration		Not applicable	-	Not applicable	-
TRS configuration		TRS.2.1 TDD	-	TRS.2.1 TDD	-
TCI state		TCI.State.0	-	TCI.State.0	-
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
Control channel RMC		CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns		OP.3	OP.3	OP.3	OP.3
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
SMTC configuration		SMTC.1	SMTC.1	SMTC.1	SMTC.1
PRS configuration		PRS.1.1 FR2	PRS.1.1 FR2	PRS.1.2 FR2	PRS.1.2 FR2
PRS muting info		'10'	'01'	'10'	'01'
Expected RSTD	μs	N/A	3	N/A	3
Expected RSTD uncertainty	μs	N/A	5	N/A	5
Time offset with Cell 1	μs	-	3	-	3
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.					

Table A.7.7.10.1.1-3: RSTD accuracy OTA related test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1			
Assumption for UE beams Note 5		Rough		Rough	
N_{oc} Note1	dBm/SCS Note3	-98		-98	
$\hat{E}_s/N_{oc}$	dB	-6	-13	-6	-13
PRS-RSRP Note2	dBm/SCS	-104	-111	-104	-111
$\hat{E}_s/I_{ot\ BB}$ Note4	dB	-6	-13	-6	-13
Io Note2	dBm/95.04 MHz Note3	-68.04	-68.80	-68.04	-68.80

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SSB_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.10.1.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

A.7.7.10.2 RSTD measurement accuracy test case for dual positioning frequency layer

A.7.7.10.2.1 Test purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the accuracy requirements specified in clause 10.1.23.2 in an environment with AWGN propagation conditions. The *NR-TDOA-ProvideAssistanceData* and *NR-TDOA-RequestLocationInformation* message as defined in TS 37.355 shall be provided to the UE before the start of the test. The test duration should be larger than the UE measurement period as defined in clause 9.9.2.

The supported test configurations are specified in Table A.7.7.10.2.1-1.

Table A.7.7.10.2.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

In the test there are two synchronous cells: Cell 1 and Cell 2. Cell 1 is the reference as well as the PCell on NR RF channel #1 in FR2. Cell 2 is a neighbour cell on a different NR RF channel #2 in FR2. GP#13 is configured for the test.

Table A.7.7.10.2.1-2: RSTD accuracy test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
PRS ARFCN		freq1		freq1	
PRS ARFCN		freq1	freq2	freq1	freq2
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
BW$_{channel}$	MHz	100: $N_{RB,c}$ = 66		100: $N_{RB,c}$ = 66	
Downlink initial BWP configuration		DLBWP.0.1	-	DLBWP.0.1	-
Downlink dedicated BWP configuration		DLBWP.1.1	-	DLBWP.1.1	-
Uplink initial BWP configuration		ULBWP.0.1	-	ULBWP.0.1	-
Uplink dedicated BWP configuration		ULBWP.1.1	-	ULBWP.1.1	-
DRX cycle configuration		Not applicable	-	Not applicable	-
TRS configuration		TRS.2.1 TDD	-	TRS.2.1 TDD	-
TCI state		TCI.State.0	-	TCI.State.0	-
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
Control channel RMC		CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns		OP.3	OP.3	OP.3	OP.3
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
SMTC configuration		SMTC.1	SMTC.1	SMTC.1	SMTC.1
PRS configuration		PRS.1.1 FR2	PRS.1.1 FR2	PRS.1.2 FR2	PRS.1.2 FR2
Expected RSTD	μs	N/A	3	N/A	3
Expected RSTD uncertainty	μs	N/A	5	N/A	5
Time offset with Cell 1	μs	-	3	-	3
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.					

Table A.7.7.10.2.1-3: RSTD accuracy OTA related test parameters

Parameter	Unit	Test 1		Test 2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1			
Assumption for UE beams Note 5		Rough		Rough	
N_{oc} Note1	dBm/SCS Note3	-98		-98	
$\hat{E}_s/N_{oc}$	dB	-6	-13	-6	-13
PRS-RSRP Note2	dBm/SCS	-104	-111	-104	-111
$\hat{E}_s/I_{ot\ BB}$ Note4	dB	-6	-13	-6	-13
Io Note2	dBm/95.04 MHz Note3	-68.04	-68.80	-68.04	-68.80

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SSB_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.10.2.2 Test Requirements

The RSTD measurement accuracy for Cell 2 shall fulfil the absolute requirement in clause 10.1.23.2.

A.7.7.11 PRS-RSRP measurements

A.7.7.11.1 SA measurement accuracy with PRS in FR2

A.7.7.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that the PRS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.24.2.1 and 10.1.24.2.2.

A.7.7.11.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.11.1.2-1. Both absolute and relative accuracy of PRS-RSRP measurements are tested by using the parameters in Table A.7.7.11.1.2-2 and A.7.7.11.1.2-3. In all test cases, Cell 1 is the PCell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.11.1.2-1: PRS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.11.1.2-2: PRS-RSRP general test parameters

Parameter	Unit	T1		T2	
		Cell 1	Cell 2	Cell 1	Cell 2
Cell ID		489	0	489	0
SSB ARFCN		freq1		freq1	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 24		100: $N_{RB,c}$ = 24	
Downlink initial BWP configuration		DLBWP.0.1	-	DLBWP.0.1	-
Downlink dedicated BWP configuration		DLBWP.1.1	-	DLBWP.1.1	-
Uplink initial BWP configuration		ULBWP.0.1	-	ULBWP.0.1	-
Uplink dedicated BWP configuration		ULBWP.1.1	-	ULBWP.1.1	-
DRX cycle configuration		Not applicable	-	Not applicable	-
Measurement gap		GP#0 or GP#24 Note2			
TRS configuration		TRS.2.1 TDD	-	TRS.2.1 TDD	-
TCI state		TCI.State.0	-	TCI.State.0	-
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
Control channel RMC		CCR.3.1 TDD	-	CCR.3.1 TDD	-
OCNG Patterns		OP.3	OP.3	OP.3	OP.3
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
SMTC configuration		SMTC.1	SMTC.1	SMTC.1	SMTC.1
Time offset with Cell 1	μs	-	3	-	3
PRS configuration		PRS.1.1 FR2	PRS.1.2 FR2	PRS.1.1 FR2	PRS.1.2 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0	0
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.					

Table A.7.7.11.1.2-3: PRS-RSRP OTA related test parameters

Parameter	Unit	T1		T2	
		Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1			
Assumption for UE beams Note 7		Rough		Rough	
N_{oc} Note1	dBm/15kHz Note4	-91.6		N/A	
N_{oc} Note1	dBm/SCS Note4	-82.6		N/A	
$\hat{E}_s/N_{oc}$	dB	6.0	1.0	N/A	N/A
E_s	dBm/SCS Note4	-	-	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)
PRS_RP Note2	dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)
$\hat{E}_s/I_{ot\,BB}$ Note6	dB	2.44	-5.98	-5.98	-5.98
Io Note2	dBm/95.04 MHz Note4	-50.05		(Table B.2.2-2 Rx Beam Peak +29.70dB)	
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: PRS_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: Void Note 6: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4. Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.7.7.11.1.3 Test Requirements

The PRS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clause 10.1.24.2.1 and relative requirement in clause 10.1.24.2.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported PRS-RSRP is in the range shown in table A.7.7.11.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported PRS-RSRP meets the requirements in Table 10.1.24.2.2-2.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported PRS-RSRP is in the range shown in table A.7.7.11.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported PRS-RSRP meets the requirements in Table 10.1.24.2.2-2.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported PRS-RSRP meets the requirements in Table 10.1.24.2.2-2.

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported PRS-RSRP meets the requirements in Table 10.1.24.2.2-2.

Table A.7.7.11.1.3-1: PRS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3
Cell 1	PRS_RP1 -δ $+G_{min}$ ≤ Reported RSRP(dBm) ≤ PRS_RP1 +δ $+G_{max}$
Cell 2	PRS_RP2 -δ $+G_{min}$ ≤ Reported RSRP(dBm) ≤ PRS_RP2 +δ $+G_{max}$
Note 1: PRS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration. Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.24.2.1-2, selected according to the Io used in the test. Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class	

A.7.7.12 UE Rx-Tx time difference measurements

A.7.7.12.1 UE Rx-Tx time difference measurement period for single positioning frequency layer in FR2 SA

A.7.7.12.1.1 Test purpose and environment

The purpose of the test is to verify that the UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.25.2. The test is conducted in AWGN propagation condition in FR2 in standalone scenario when single positioning frequency layer is configured.

The supported test configurations in listed in Table A.7.7.12.1.1-1.

Table A.7.7.12.1.1-1: Supported test configurations

Config	Description
1	120 kHz SSB and PRS SCS, 100 MHz bandwidth, TDD duplex mode

There are two cells in the test: PCell (Cell 1) and a neighbour cell (Cell 2). All cells are on the same RF channel in FR2.

The *NR-Multi-RTT-ProvideAssistanceData* as defined in TS 37.355 [34, clause 6.5.12.1], shall be provided to the UE before the start of the test.

The UE is configured with measurement gap pattern ID #0 or ID #24 before the test.

The UE is configured to transmit SRS on Cell 1 during the test.

The test equipment measures the transmit timing of the UE using the transmitted SRS and measures the receive timing using the PRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE for each cell.

A.7.7.12.1.2 Test parameters

The UE Rx-Tx time difference accuracy test parameters are given in Table A.7.7.12.1.2-1. The SRS configuration parameters for UE Rx-Tx time difference test is given in Table A.7.7.12.1.2-2.

Table A.7.7.12.1.2-1: SRS configuration for UE Rx-Tx time difference measurement accuracy test

Parameter	Unit	Test configuration	Cell 1		Cell 2	
AoA setup		1	Setup 1 as specified in clause A.3.15			
Beam Assumption Note 7		1	Rough		Rough	
Measurement gap		1	GP#24 or GP#0 Note 8			
DRX		1	OFF			
Time offset with Cell 1	μs	1	N/A		3	
TDD configuration		1	TDDConf.3.1		TDDConf.3.1	
PDSCH RMC configuration		1	SR.3.1 TDD		N/A	
RMSI CORESET RMC configuration		1	CR.3.1 TDD		N/A	
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD		N/A	
OCNG Patterns		1	OP.1		OP.1	
TRS Configuration		1	TRS.2.1 TDD		N/A	
Initial BWP configuration		1	DLBWP.0.1 ULBWP.0.1		N/A	
Active DL BWP configuration		1	DLBWP.1.1		N/A	
Active UL BWP configuration		1	ULBWP.1.1		N/A	
PRS configuration		1	PRS.1.1 FR2		PRS.1.1 FR2	
N_{oc} Note 2	dBm/SCS	1	-89			
N_{oc} Note 2	dBm/15 kHz	1	-98			
PRS $\hat{E}_s/I_{ot}$	dB	1	-Infinity	-2.41	-Infinity	-12.12
PRS $\hat{E}_s/N_{oc}$	dB	1	-Infinity	-2	-Infinity	-10
PRS-RSRP Note 3	dBm/SCS kHz	1	-Infinity	-91	-Infinity	-99
Io	dBm/95.04 MHz	1	N/A	-57.63	N/A	-57.63
Propagation Condition		1	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: PRS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: PRS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8: GP#24 is configured if UE supports MG#24, otherwise GP#0 is configured.

Table A.7.7.12.1.2-2: SRS configuration for UE Rx-Tx time difference measurement accuracy test

SRS-ResourceId	0
nrofSRS-Ports	Port1
transmissionComb	n4
combOffset-n4	0
cyclicShift-n4	0
resourceMapping startPosition	0
resourceMapping nrofSymbols	n4
resourceMapping repetitionFactor	n1
freqDomainPosition	0
freqDomainShift	0
freqHopping c-SRS	Matches $N_{RB,c}$
groupOrSequenceHopping	Neither
resourceType	Periodic
periodicityAndOffset-p	160*2^u, 20*2^u
sequenceId	0

A.7.7.12.1.3 Test requirements

The UE Rx-Tx time difference measurement time fulfils the UE Rx-Tx measurement accuracy requirements specified in clause 10.1.25.2 for both Cell 1 and Cell 2.

A.8 E-UTRA standalone tests for NR RRM

Editor notes: All NR RRM tests under E-UTRA standalone operations are included in this Annex. All EN-DC related NR RRM tests are in A.4 and A.5.

A.8.1 Void

A.8.2 RRC_IDLE state mobility

A.8.2.1 Inter-RAT NR Cell re-selection

A.8.2.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1

A.8.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.6 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.8.2.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.8.2.1.1.1-1: Supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.2.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE camps on cell 2 in the initial phase
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
T1 end condition	Active cell			Cell1	During T1 period the UE reselects to cell 1
	Neighbour cell			Cell2	
T3 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T3
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
RF Channel Number			1, 2, 3, 4, 5, 6	1, 2	E-UTRAN radio channel (1) and NR radio channel (2) are used for this test
Time offset between cells			1, 4	3 ms	Asynchronous cells
			2, 5	3 μs	Synchronous cells
			3, 6	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		s	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2, 3, 4, 5, 6	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3		s	1, 2, 3, 4, 5, 6	75	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.8.2.1.1.1-3: Cell specific test parameters for NR cell 2

Parameter	Unit	Test configuration	Cell 2		
			T1	T2	T3
TDD configuration		1, 4	N/A		
		2, 5	TDDConf.1.1		
		3, 6	TDDConf.2.1		
PDSCH Reference measurement channel		1, 4	SR.1.1 FDD		
		2, 5	SR.1.1 TDD		
		3, 6	SR.2.1 TDD		
RMSI CORESET Reference Channel		1, 4	CR.1.1 FDD		
		2, 5	CR.1.1 TDD		
		3, 6	CR.2.1 TDD		
RMC CORESET Reference Channel		1, 4	CCR.1.1 FDD		
		2, 5	CCR.1.1 TDD		
		3, 6	CCR.2.1 TDD		
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1		
SMTC configuration		1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration		1, 4	SSB.1 FR1		
		2, 5	SSB.1 FR1		
		3, 6	SSB.2 FR1		
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1		
RLM-RS		1, 2, 3, 4, 5, 6	SSB		
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140		
		3, 6	-137		
Pcompensation	dB	1, 2, 3, 4, 5, 6	0		
$Qhyst_s$	dB	1, 2, 3, 4, 5, 6	0		
$Qoffset_{s, n}$	dB	1, 2, 3, 4, 5, 6	0		
Cell_selection_and_reselection_quality_measurement		1, 2, 3, 4, 5, 6	SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1, 4	-4	-infinity	12
		2, 5			
		3, 6			
N_{oc} Note2	dBm/SCS	1, 4	-98		
		2, 5	-98		
		3, 6	-95		
N_{oc} Note2	dBm/15 kHz	1, 4	-98		
		2, 5			
		3, 6			
$\hat{E}_s/N_{oc}$	dB	1, 4	-4	-infinity	12
		2, 5			
		3, 6			
SS-RSRP Note3	dBm/SCS	1, 4	-102	-infinity	-86
		2, 5	-102	-infinity	-86
		3, 6	-99	-infinity	-83
Io	dBm/9.36 MHz	1, 4	-68.60	-70.05	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-70.05	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-63.95	-51.69
Treselection	s	1, 2, 3, 4, 5, 6	0	0	0

SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	50
$Thresh_{x, highP}$	dB	1, 2, 3, 4, 5, 6	48
$Thresh_{serving, lowP}$	dB	1, 2, 3, 4, 5, 6	44
$Thresh_{x, lowP}$	dB	1, 2, 3, 4, 5, 6	50
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

Table A.8.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit	Cell 1		
		T1	T2	T3
E-UTRA RF Channel number		1		
$BW_{channel}$	MHz	10		
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6		
PBCH_RA	dB	0		
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB			
PHICH_RB	dB			
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA Note 1	dB			
OCNG_RB Note 1	dB			
Qrxlevmin	dBm	-140		
N_{oc} Note 2	dBm/15 kHz	-98		
RSRP Note 3	dBm/15 KHz	-84	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14	14
$\hat{E}_s/N_{oc}$	dB	14	14	14
$Treselection_{EUTRAN}$	S	0		
SnonintrasearchP	dB	50		
$Thresh_{x, highP}$	dB	48		
$Thresh_{serving, lowP}$	dB	44		
$Thresh_{x, lowP}$	dB	50		
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.8.2.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search} + T_{evaluate, NR} + T_{SI\text{-}NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR} + T_{SI\text{-}NR}$,

Where:

$T_{higher\_priority\_search}$ See clause 4.2.2 in TS 36.133 [15]

$T_{evaluate, NR}$ See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.8.2.1.2 E-UTRA Cell reselection to lower priority NR target Cell in FR1 for UE configured with highSpeedInterRAT-NR-r16

A.8.2.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.6 in 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.8.2.1.2.1-1, A.8.2.1.2.1-2, A.8.2.1.2.1-3 and A.8.2.1.2.1-4. In SIB of the E-UTRA cell, highSpeedInterRAT-NR-r16 is configured and the carrier of NR cell is configured with highSpeedCarrierNR-r16. The test consists of two time periods, with time duration of T1 and T2 respectively. Both E-UTRA cell 1 and NR cell 2 are already identified by the UE prior to the start of the test. NR cell 2 is of lower priority than E-UTRA cell 1.

Table A.8.2.1.2.1-1: Supported test configurations for UE configured with highSpeedInterRAT-NR-r16

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.2.1.2.1-2: General test parameters in E-UTRA cell re-selection FR1 NR cell test case for UE configured with highSpeedInterRAT-NR-r16

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase
T1 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2 during T1
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	
T2 end condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1 during T2 for iteration of the tests.
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
RF Channel Number			1, 2, 3, 4, 5, 6	1, 2	E-UTRAN radio channel (1) and NR radio channel (2) are used for this test
Time offset between cells			1, 4	3 ms	Asynchronous cells
			2, 5	3 μs	Synchronous cells
			3, 6	3 μs	Synchronous cells

Access Barring Information	-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle length	s	1, 2, 3, 4, 5, 6	0.32	The value shall be used for all cells in the test.
NR PRACH configuration index		1, 2, 3, 4, 5, 6	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1	s	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2	s	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.8.2.1.2.1-3: Cell specific test parameters for NR cell 2 in E-UTRA cell re-selection FR1 NR cell test case for UE configured with highSpeedInterRAT-NR-r16

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
TDD configuration		1, 4	N/A	
		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
PDSCH Reference measurement channel		1, 4	SR.1.1 FDD	
		2, 5	SR.1.1 TDD	
		3, 6	SR.2.1 TDD	
RMSI CORESET Reference Channel		1, 4	CR.1.1 FDD	
		2, 5	CR.1.1 TDD	
		3, 6	CR.2.1 TDD	
RMC CORESET Reference Channel		1, 4	CCR.1.1 FDD	
		2, 5	CCR.1.1 TDD	
		3, 6	CCR.2.1 TDD	
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration		1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1	
RLM-RS		1, 2, 3, 4, 5, 6	SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140	
		3, 6	-137	
Pcompensation	dB	1, 2, 3, 4, 5, 6	0	
$Qhyst_s$	dB	1, 2, 3, 4, 5, 6	0	
$Qoffset_{s,n}$	dB	1, 2, 3, 4, 5, 6	0	
Cell_selection_and_reselection_quality_measurement		1, 2, 3, 4, 5, 6	SS-RSRP	
$\hat{E}_s/I_{ot}$	dB	1, 4	-4	12
		2, 5		
		3, 6		

N_{oc} Note2	dBm/SCS	1, 4	-98	
		2, 5	-98	
		3, 6	-95	
N_{oc} Note2	dBm/15 kHz	1, 4	-98	
		2, 5		
		3, 6		
$\hat{E}_s/N_{oc}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
SS-RSRP Note3	dBm/SCS	1, 4	-102	-86
		2, 5	-102	-86
		3, 6	-99	-83
Io	dBm/9.36 MHz	1, 4	-68.60	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-51.69
Treselection	s	1, 2, 3, 4, 5, 6	0	
Snonintrasearch	dB	1, 2, 3, 4, 5, 6	Not sent	
$Thresh_{x,\ high}$	dB	1, 2, 3, 4, 5, 6	48	
$Thresh_{serving,\ low}$	dB	1, 2, 3, 4, 5, 6	44	
$Thresh_{x,\ low}$	dB	1, 2, 3, 4, 5, 6	50	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN 3334 Note 4	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The AWGN 3334 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 3334 Hz.

Table A.8.2.1.2.1-4: Cell specific test parameters for E-UTRA cell 1 in E-UTRA cell re-selection FR1 NR cell test case for UE configured with highSpeedInterRAT-NR-r16

Parameter	Unit	Cell 1	
		T1	T2

E-UTRA RF Channel number		1	
$BW_{channel}$	MHz	10	
OCNG Patterns defined in TS 36.133 clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6	
PBCH_RA	dB	0	
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA Note 1	dB		
OCNG_RB Note 1	dB		
Qrxlevmin	dBm	-140	
N_{oc} Note 2	dBm/15 kHz	-98	
RSRP Note 3	dBm/15 KHz	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14
$\hat{E}_s/N_{oc}$	dB	14	14
$Treselection_{EUTRAN}$	S	0	
Snonintrasearch	dB	50	
$Thresh_{x, high}$	dB	48	
$Thresh_{serving, low}$	dB	44	
$Thresh_{x, low}$	dB	50	
Propagation Condition		AWGN 1944 Hz Note4	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.			

A.8.2.1.2.2 Test Requirements

The cell reselection delay to a lower priority NR cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 3 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate, NR} + T_{SI-NR}$,

Where:

$T_{evaluate, NR}$ See Table 4.2.2.5.6-2 in clause 4.2.2.5.6 in [15]

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 2.24 s, allow 3 s for the cell re-selection delay to a lower priority NR cell.

A.8.2.2 E-UTRA – NR Inter-RAT Early Measruement Reporting

A.8.2.2.1 E-UTRA – NR Early Measruement Reporting for NR in FR1

A.8.2.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT Idle mode DC measurement requirements specified in clause 4.9.2.4 in TS 36.133 [15]. This test is also to verify the accuracy requirement for the E-UTRAN to NR inter-RAT Idle mode DC measurement requirements specified in clause 9.11.1A and 9.11.2A in TS 36.133 [15]. Supported test configurations are shown in Table A.8.2.2.1.1-1.

Table A.8.2.2.1.1-1: Supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

The test scenario comprises of 1 E-UTRA cell (Cell 1) and 1 NR cell (Cell 2). The the test parameters and applicability for the E-UTRAN cell are defined in Table A.8.2.2.1.1-4. The general test parameters and the cell specific test parameters for the NR cell are speficied in Table A.8.2.2.1.1-2 and Table A.8.2.2.1.1-3, respectively.

The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Prior to the start of the time duration T1, the UE shall be connected to Cell 1. During T1, Cell 2 shall be powered off. At the end of T1, the RRC connection to Cell 1 is released and UE is configured Idle mode DC measurement on the carrier frequency of Cell 2. Time duration T2 starts when the RRC connection is released, and during the T2 UE is in Idle mode. Cell 2 shall be powered on from the beginning of T2. At beginning of T3 the UE is paged for connection setup and requested by the network to send idle mode measurements.

Table A.8.2.2.1.1-2: General test parameters

Parameter	Unit	Test configuration	Value	Comment
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1	
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 2	
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2	
DRX cycle length	s	1, 2, 3, 4, 5, 6	1.28	
Time offset between Cell 1 and Cell 2		1, 2, 3, 4, 5, 6	3 μs	
T1	s	1, 2, 3, 4, 5, 6	0.5	
T2	s	1, 2, 3, 4, 5, 6	71	
T3	s	1, 2, 3, 4, 5, 6	2	
T331	s	1, 2, 3, 4, 5, 6	300	

Table A.8.2.2.1.1-3: Cell specific test parameters for NR cell 2

Parameter	Unit	Test configuration	Cell 2		
			T1	T2	T3
TDD configuration		1, 4	N/A		
		2, 5	TDDConf.1.1		
		3, 6	TDDConf.2.1		
PDSCH Reference measurement channel		1, 4	SR.1.1 FDD		
		2, 5	SR.1.1 TDD		
		3, 6	SR.2.1 TDD		
RMSI CORESET Reference Channel		1, 4	CR.1.1 FDD		
		2, 5	CR.1.1 TDD		
		3, 6	CR.2.1 TDD		
RMC CORESET Reference Channel		1, 4	CCR.1.1 FDD		
		2, 5	CCR.1.1 TDD		
		3, 6	CCR.2.1 TDD		
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1		
SMTC configuration		1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration		1, 4	SSB.1 FR1		
		2, 5	SSB.1 FR1		
		3, 6	SSB.2 FR1		
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1		
$\hat{E}_s/I_{ot}$	dB	1, 4	-infinity	4	4
		2, 5			
		3, 6			
N_{oc} Note2	dBm/SCS	1, 4	-98		
		2, 5	-98		
		3, 6	-95		
N_{oc} Note2	dBm/15 kHz	1, 4	-98		
		2, 5			
		3, 6			
$\hat{E}_s/N_{oc}$	dB	1, 4	-infinity	-4	-4
		2, 5			
		3, 6			
SS-RSRP Note3	dBm/SCS	1, 4	-infinity	-102	-102
		2, 5	-infinity	-102	-102
		3, 6	-infinity	-99	-99
SS-RSRQ Note3	dB	1, 4	-infinity	-16.25	-16.25
		2, 5	-infinity	-16.25	-16.25
		3, 6	-infinity	-16.25	-16.25
Io	dBm/9.36 MHz	1, 4	-70.05	-68.60	-68.60
	dBm/9.36 MHz	2, 5	-70.05	-68.60	-68.60
	dBm/38.16 MHz	3, 6	-63.96	-62.50	-62.50
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.2.2.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit	Cell 1		
		T1	T2	T3
E-UTRA RF Channel number		1		
$BW_{channel}$	MHz	10		
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6		
PBCH_RA	dB	0		
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB			
PHICH_RB	dB			
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA Note 1	dB			
OCNG_RB Note 1	dB			
Qrxlevmin	dBm	-140		
N_{oc} Note 2	dBm/15 kHz	-98		
RSRP Note 3	dBm/15 KHz	-84	-84	-84
RSRQ Note 3	dB	-10.96	-10.96	-10.96
$\hat{E}_s/I_{ot}$	dB	14	14	14
$\hat{E}_s/N_{oc}$	dB	14	14	14
$Treselection_{EUTRAN}$	S	0		
SnonintrasearchP	dB	50		
$Thresh_{x, highP}$	dB	48		
$Thresh_{serving, lowP}$	dB	44		
$Thresh_{x, lowP}$	dB	50		
beamMeasConfigIdle		True		
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.8.2.2.1.2 Test Requirements

At the beginning of the time-period T2 the connection is released, and UE enters idle mode. During the time period T2 the UE is in Idle mode and Cell 2 is active. The UE shall not perform reselection. The UE shall perform Idle Mode DC measurement according to clause 4.9.2.4 in TS 36.133 [15]. UE shall be able to detect, acqure the SSB index and measure the SS-RSRP and SS-RSRQ from Cell 2 for Idle mode DC measurement during T2.

NOTE: The Idle mode DC measurement period for the test setup can be expressed as: $T_{higher\_priority\_search}$ + $T_{SSB\_index,NR}$ + $T_{evaluate, NR}$.

Where:

$T_{higher\_priority\_search}$ See clause 4.2.2 in TS 36.133 [15]

$T_{SSB\_index,NR}$ See Table 4.9.2.4-1 in clause 4.9.2.4 in TS 36.133 [15]

$T_{evaluate, NR}$ See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

This gives a total of 70.24 s, allow 71 s for the T2.

At the start of T3 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report. The UE shall send early measurement report to the PCell.

After receiving the requested early measurement report, the test equipment verifies the accuracy of measurement reported for serving Cell 1 and Cell 2 meets the requirements in Section 9.1.2B in TS 36.133 [15] and Section 9.1.3B, respectively and test ends.

The rate of correct events observed during repeated tests shall be at least 90%.

A.8.3 RRC_CONNECTED state mobility

A.8.3.1 Handover

A.8.3.1.1 E-UTRAN - NR handover in FR1

A.8.3.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements as specified in clause 6.1.2.1 specified in clause 5.3.4 in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.8.3.1.1-1. General test parameters are provided in Table A.8.3.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.8.3.1.1-3 and A.8.3.1.1-4 respectively.

Table A.8.3.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.3.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	E-UTRAN cell
	Neighbouring cell		Cell 2	NR cell
Final condition	Active cell		Cell 2	
NR measurement quantity			SS-RSRP	
E-UTRAN measurement quantity			RSRP	
b2-Threshold1		dBm	-83	Absolute E-UTRAN RSRP threshold for event B2
b2-Threshold2NR		dBm	As specified in Table A.8.3.1.1-4	Absolute NR SS-RSRP threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		s	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 8.1.2.1-1 started before T2 starts [15]
T1		s	5	
T2		s	≤5	
T3		s	1	

Table A.8.3.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover (Cell 1)

Parameter	Unit	Configuration	Cell 1		
			T1	T2	T3
RF channel number		1, 2, 3, 4, 5, 6	2		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration[Note1]		4, 5, 6	6		
TDD uplink-downlink configuration[Note1]		4, 5, 6	1		
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100		
PRACH Configuration[Note2]		1, 2, 3	4		
		4, 5, 6	53		
PDSCH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD		

		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD		
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD		
OCNG Patterns[Note3]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD		
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD		
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0		
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA[Note4]					
OCNG_RB[Note4]					
N_{oc}[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-98		
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	7	7	7
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2, 3, 4, 5, 6	7	7	7
RSRP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
SCH_RP[Note6]	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
Io[Note6]	dBm/9MHz	1, 2, 3, 4, 5, 6	-62.43	-62.43	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and Correlation Matrix [Note7]		1, 2, 3, 4, 5, 6	1x2 Low		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 6: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.3.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

Parameter		Unit	Configuration	Cell 2		
				T1	T2	T3
RF channel number			1, 2, 3, 4, 5, 6	1		
Duplex mode			1, 4	FDD		
			2, 3, 5, 6	TDD		
TDD Configuration			2, 5	TDDConf.1.1		
			3, 6	TDDConf.2.1		
$BW_{channel}$		MHz	1, 4	10: $N_{RB,c}$ = 52 (FDD)		
			2, 5	10: $N_{RB,c}$ = 52 (TDD)		
			3, 6	40: $N_{RB,c}$ = 106 (TDD)		
PDSCH reference measurement channel			1, 4	SR.1.1 FDD		
			2, 5	SR.1.1 TDD		
			3, 6	SR.2.1 TDD		
CORSET reference channel			1, 4	CR.1.1 FDD		
			2, 5	CR.1.1 TDD		
			3, 6	CR.2.1 TDD		
PRACH configuration				FR1 PRACH configuration 1		
OCNG pattern[Note1]			1, 2, 3, 4, 5, 6	OP.1		
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1		
	Dedicated DL BWP			DLBWP.1.1		
	Initial UL BWP			ULBWP.0.1		
	Dedicated UL BWP			ULBWP.1.1		
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration			1, 2, 4, 5	SSB.1 FR1		
			3, 6	SSB.2 FR1		
b2-Threshold2NR		dBm	1, 2, 4, 5	-106		
			3, 6	-103		
EPRE ratio of PSS to SSS		dB	1, 2, 3, 4, 5, 6	0		
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS						
N_{oc}[Note2]		dBm/15 KHz	1, 2, 3, 4, 5, 6	-98		
N_{oc}[Note2]		dBm/SCS	1, 2, 4, 5	-98		
			3, 6	-95		
$\hat{E}_s/N_{oc}$		dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
SS-RSRP[Note3]		dBm/SCS	1, 2, 4, 5	-inifinity	-98	-98
			3, 6	-inifinity	-95	-95
Io[Note3]		dBm/9.36 MHz	1, 2, 4, 5	-70.05	-67.04	-67.04
		dBm/38.16 MHz	3, 6	-63.96	-60.94	-60.94
Propagation condition			1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and			1, 2, 3, 4, 5, 6	1x2 Low		

Correlation Matrix			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			

A.8.3.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in TS36.331.

$T_{interrupt}$ = 62 ms in the test; $T_{interrupt}$ is defined in TS36.133 clause 5.3.4.3.

This gives a total of 112 ms.

A.8.4 Measurement procedure

A.8.4.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay

A.8.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay in non-DRX

A.8.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.1.1-1 below. Test parameters and cell-specific parameters for the NR cell are provided in Tables A.8.4.1.1.1-2 and A.8.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1.

Table A.8.4.1.1.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.4.1.1.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1		One NR FR1 carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	Cell 1		Cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	Cell 2		Cell 2 is on NR RF channel number 1.
SSB configuration		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
CP length		Config 1,2,3,4,5,6	Normal		Applicable to both cells.
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Frame time offset between serving and neighbour cells	ms	Config 1,2,4,5	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	µs	Config 3,6	3		Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	s	Config 1,2,3,4,5,6	1		

Table A.8.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Cell 2
NR RF Channel Number		Config 1,2,3,4,5,6	1
Duplex mode		Config 1,4	FDD
		Config 2,3,5,6	TDD
$BW_{channel}$	MHz	Config 1,4	10: $N_{RB,c}$ = 52
		Config 2,5	10: $N_{RB,c}$ = 52
		Config 3,6	40: $N_{RB,c}$ = 106
TDD configuration		Config 2,5	TDDConf.1.1
		Config 3,6	TDDConf.2.1
OCNG Pattern defined in A.3.2.1.1		Config 1,2,3,4,5,6	OP.1
SMTC configuration		Config 1,2,3,4,5,6	SMTC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15
		Config 3,6	30
EPRE ratio of PSS to SSS	dB	Config 1,2,3,4,5,6	0
EPRE ratio of PBCH DMRS to SSS	dB		
EPRE ratio of PBCH to PBCH DMRS	dB		
EPRE ratio of OCNG DMRS to SSS Note 1	dB		
EPRE ratio of OCNG to OCNG DMRS Note 1	dB		
N_{oc} Note2	dBm/15kHz		-98
N_{oc} Note2	dBm/SCS	Config 1,2,4,5	-98
		Config 3,6	-95
SS-RSRP Note 3, 4	dBm/SCS	Config 1,2,4,5	-94
		Config 3,6	-91
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3,4,5,6	4
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	4
Io Note 3	dBm/9.36MHz	Config 1,2,4,5	-64.59
	dBm/38.16MHz	Config 3,6	-58.50
Propagation Condition		Config 1,2,3,4,5,6	AWGN

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at $T_{RRC\_procedure\_delay} + T_{measure\_SFTD1}$ after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI_{DCCH} longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.1.2 E-UTRA – NR Inter-RAT SFTD Measurement Delay in DRX

A.8.4.1.2.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.2.1-1 below. Test parameters are provided in Tables A.8.4.1.2.1-2 below. Cell-specific parameters for the E-UTRA and NR cells are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1, and Table A.8.4.1.1.1-3 in clause A.8.4.1.1.1, respectively.

Table A.8.4.1.2.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.4.1.2.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1		One NR FR1 carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	Cell 1		Cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	Cell 2		Cell 2 is on NR RF channel number 1.
SSB configuration		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
CP length		Config 1,2,3,4,5,6	Normal		Applicable to both cells.
DRX		Config 1,2,3,4,5,6	DRX.4		DRX configuration as specified in clause A.3.3.4
Frame time offset between serving and neighbour cells	ms	Config 1,2,4,5	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μs	Config 3,6	3		Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	s	Config 1,2,3,4,5,6	1		

A.8.4.1.2.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at the earliest DRX activity time following upon $T_{RRC\_procedure\_delay} + T_{measure\_SFTD1}$ from the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2\times TTI_{DCCH}$ longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2 E-UTRA – NR Inter-RAT Measurements

A.8.4.2.1 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.8.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.1.1-1, A.8.4.2.1.1-2, A.8.4.2.1.1-3 and A.8.4.2.1.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2, 3, 4, 5, 6	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs		Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5		
T2	s	1, 2, 3, 4, 5, 6	1	1	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.1.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.1.1-4					

Table A.8.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink configuration[Note1]		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50	

			20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2, 3, 4, 5, 6	17	17
RSRP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io[Note5]	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2, 3, 4, 5, 6	TDL-C 300ns 100Hz	
Antenna Configuration and Correlation Matrix[Note6]		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	FDD	
		2, 3, 5, 6	TDD	
TDD configuration		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
$BW_{channel}$	MHz	1, 2, 4, 5	10: $N_{RB,c}$ = 52	
		3, 6	40: $N_{RB,c}$ = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 4	SMTC.2	
		2, 3, 5, 6	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	15	
		3, 6	30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-101	
		3, 6	-98	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
N_{oc} Note2	dBm/SCS	1, 2, 4, 5	-98	
		3, 6	-95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io Note3	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MHz	3, 6	-63.95	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.2 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.8.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.2.1-1, A.8.4.2.2.1-2, A.8.4.2.2.1-3 and A.8.4.2.2.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6	1				One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2				NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX.9	DRX.12	DRX.9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour cells		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs				Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5				
T2	s	1, 2, 3, 4, 5, 6	2	11	2	11	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.2.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.2.1-4							

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink		4, 5, 6	1	

configuration[Note1]				
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2, 3, 4, 5, 6	17	17
RSRP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io[Note5]	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2, 3, 4, 5, 6	TDL-C 300ns 100Hz	
Antenna Configuration and Correlation Matrix [Note6]		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	FDD	
		2, 3, 5, 6	TDD	
TDD configuration		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
$BW_{channel}$	MHz	1, 2, 4, 5	10: $N_{RB,c}$ = 52	
		3, 6	40: $N_{RB,c}$ = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 4	SMTC.2	
		2, 3, 5, 6	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	15	
		3, 6	30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-101	
		3, 6	-98	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
N_{oc} Note2	dBm/SCS	1, 2, 4, 5	-98	
		3, 6	-95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io Note3	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MHz	3, 6	-63.95	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				

A.8.4.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1		One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3 ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs		Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5		
T2	s	1, 2, 3, 4, 5, 6	2	1	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.3.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.3.1-4					

Table A.8.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink configuration[Note1]		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2, 3, 4, 5, 6	17	17
RSRP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io[Note5]	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2, 3, 4, 5, 6	TDL-C 300ns 100Hz	
Antenna Configuration and Correlation Matrix [Note6]		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3:	OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	FDD	
		2, 3, 5, 6	TDD	
TDD configuration		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
$BW_{channel}$	MHz	1, 2, 4, 5	10: $N_{RB,c}$ = 52	
		3, 6	40: $N_{RB,c}$ = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 4	SMTC.2	
		2, 3, 5, 6	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	15	
		3, 6	30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-101	
		3, 6	-98	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
N_{oc} Note2	dBm/SCS	1, 2, 4, 5	-98	
		3, 6	-95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io Note3	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MHz	3, 6	-63.95	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6	1				One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2				NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX.9	DRX.12	DRX.9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour cells		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs				Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5				
T2	s	1, 2, 3, 4, 5, 6	2	13	2	13	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.4.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.4.1-4							

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink		4, 5, 6	1	

configuration[Note1]				
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2, 3, 4, 5, 6	17	17
RSRP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io[Note5]	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2, 3, 4, 5, 6	TDL-C 300ns 100Hz	
Antenna Configuration and Correlation Matrix [Note6]		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].				

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	FDD	
		2, 3, 5, 6	TDD	
TDD configuration		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
$BW_{channel}$	MHz	1, 2, 4, 5	10: $N_{RB,c}$ = 52	
		3, 6	40: $N_{RB,c}$ = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 4	SMTC.2	
		2, 3, 5, 6	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	15	
		3, 6	30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-101	
		3, 6	-98	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
N_{oc} Note2	dBm/SCS	1, 2, 4, 5	-98	
		3, 6	-95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io Note3	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MHz	3, 6	-63.95	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

A.8.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.5.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		1, 2	1		One E-UTRAcarrier frequency is used.
NR RF Channel Number		1, 2	1		One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	s	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs		Synchronous cells.
T1	s	1, 2	10		
T2	s	1, 2	6	3	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.5.1-3					

Table A.8.4.2.5.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter		Unit	Test configuration	Cell 2	
				T1	T2
AoA setup defined in A.3.15.2.1			1, 2	Setup 2a	
Assumption for UE beams Note 5			1, 2	Rough	
NR RF Channel Number			1, 2	1	
Duplex mode			1, 2	TDD	
TDD configuration			1, 2	TDDConf.3.1	
$BW_{channel}$		MHz	1, 2	100: $N_{RB,c}$ = 66	
OCNG patterns defined in A.3.2.1.1			1, 2	OP. 3	
SMTC configuration defined in A.3.11.1 and A.3.11.2			1	SMTC.2	
			2	SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	1, 2	120	
b1-ThresholdNR	UE power class 3	dBm/SCS	1, 2	-112	
EPRE ratio of PSS to SSS			1, 2	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Ês		dBm/SCS	1, 2	- Infinity	-80.6
SS B_RP Note 3		dBm/SCS	1, 2	-Infinity	-80.6
$\hat{E}_s/I_{ot}$ BB Note 6		dB	1, 2	-Infinity	8.3
Io Note3		dBm/95.04MHz	1, 2	-Infinity	-56.0
Propagation Condition			1, 2	AWGN	

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: SS B_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Void
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 6: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)	
	Test 1: D1 ms	Test 2: D2 ms
UE power class 3	3200	1600

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.6 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used

A.8.4.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.6.1-1, A.8.4.2.6.1-2 and A.8.4.2.6.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.6.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.6.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.6.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.6.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2	1				One FR2 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2				NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX.9	DRX.12	DRX.9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour cells		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs				Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5				
T2	s	1, 2, 3, 4, 5, 6	6	83	6	83	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2. 6.1-3							

Table A.8.4.2.6.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter		Unit	Test configuration	Cell 2	
				T1	T2
AoA setup defined in A.3.15.1			1, 2	Setup 1	
Assumption for UE beams[Note 5]			1, 2	Rough	
NR RF Channel Number			1, 2	1	
Duplex mode			1, 2	TDD	
TDD configuration			1, 2	TDDConf.3.1	
$BW_{channel}$		MHz	1, 2	100: $N_{RB,c}$ = 66	
OCNG patterns defined in A.3.2.1.1 (OP.1)			1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2			1	SMTC.2	
			2	SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	1, 2	120	
b1-ThresholdNR	UE power class 3	dBm/SCS	1, 2	-106	
EPRE ratio of PSS to SSS			1, 2	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		dBm/15kHz	1, 2	-104.7	
N_{oc} Note2		dBm/SCS	1, 2	-95.7	
SS-RSRP Note 3		dBm/SCS	1, 2	-Infinity	-87.7
$\hat{E}_s/I_{ot}$		dB	1, 2	-Infinity	8
$\hat{E}_s/N_{oc}$		dB	1, 2	-Infinity	8
Io Note3		dBm/95.04MHz	1, 2	-66.7	-58. 0
Propagation Condition			1, 2	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

Table A.8.4.2.6.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Test case	Measurement reporting delay (ms)			
	Test 1: D1 ms	Test 2: D2 ms	Test 3: D3 ms	Test 4: D4 ms
UE power class 3	4800	51200	4800	51200

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.7 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is not used

A.8.4.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.7.1-1, A.8.4.2.7.1-2 and A.8.4.2.7.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.7.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.7.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.7.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in non-DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.7.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Numbers		1, 2	1		One E-UTRA carrier frequency is used.
NR RF Channel Numbers		1, 2	1		One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	s	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs		Synchronous cells.
T1	s	1, 2	5		
T2	s	1, 2	5	3	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2. 7.1-3					

Table A.8.4.2.7.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter		Unit	Test configuration	Cell 2	
				T1	T2
AoA setup defined in A.3.15.1			1, 2	Setup 1	
Assumption for UE beams Note 5			1, 2	Rough	
NR RF Channel Number			1, 2	1	
Duplex mode			1, 2	TDD	
TDD configuration			1, 2	TDDConf.3.1	
$BW_{channel}$		MHz	1, 2	100: $N_{RB,c}$ = 66	
OCNG patterns defined in A.3.2.1.1			1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2			1	SMTC.2	
			2	SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	1, 2	120	
b1-ThresholdNR	UE power class 3	dBm/SCS	1, 2	-106	
EPRE ratio of PSS to SSS			1, 2	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		dBm/15kHz	1, 2	-104.7	
N_{oc} Note2		dBm/SCS	1, 2	-95.7	
SS-RSRP Note 3		dBm/SCS	1, 2	-Infinity	-87.7
$\hat{E}_s/I_{ot}$		dB	1, 2	-Infinity	8
$\hat{E}_s/N_{oc}$		dB	1, 2	-Infinity	8
Io Note3		dBm/95.04MHz	1, 2	-66.7	-58. 0
Propagation Condition			1, 2	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

Table A.8.4.2.7.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)	
	Test 1: D1 ms	Test 2: D2 ms
UE power class 3	4160	2080

A.8.4.2.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

A.8.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.8.1-1, A.8.4.2.8.1-2 and A.8.4.2.8.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.8.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.8.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.8.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.8.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2	1				One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2				NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0				
CP length		1, 2	Normal				
TimeToTrigger	s	1, 2	0				
Filter coefficient		1, 2	0				L3 filtering is not used
DRX			DRX.9	DRX.12	DRX.9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour cells		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs				Synchronous cells.
T1	s	1, 2	5				
T2	s	1, 2	7	70	7	70	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2. 8.1-3							

Table A.8.4.2.8.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test configuration	Cell 2	
				T1	T2
AoA setup defined in A.3.15.1			1, 2	Setup 1	
Assumption for UE beams Note 5			1, 2	Rough	
NR RF Channel Number			1, 2	1	
Duplex mode			1, 2	TDD	
TDD configuration			1, 2	TDDConf.3.1	
$BW_{channel}$		MHz	1, 2	100: $N_{RB,c}$ = 66	
OCNG patterns defined in A.3.2.1.1			1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2			1	SMTC.2	
			2	SMTC.1	
PDSCH/PDCCH subcarrier spacing		kHz	1, 2	120	
b1-ThresholdNR	UE power class 3	dBm/SCS	1, 2	-206	
EPRE ratio of PSS to SSS			1, 2	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		dBm/15kHz	1, 2	-104.7	
N_{oc} Note2		dBm/SCS	1, 2	-95.7	
SS-RSRP Note 3		dBm/SCS	1, 2	-Infinity	-87.7
$\hat{E}_s/I_{ot}$		dB	1, 2	-Infinity	8
$\hat{E}_s/N_{oc}$		dB	1, 2	-Infinity	8
Io Note3		dBm/95.04MHz	1, 2	-66.7	-58. 0
Propagation Condition			1, 2	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

Table A.8.4.2.8.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Test case	Measurement reporting delay (ms)			
	Test 1: D1 ms	Test 2: D2 ms	Test 3: D3 ms	Test 4: D4 ms
UE power class 3	6240	66560	6240	66560

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.9 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection in DRX for UE configured with highSpeedInterRAT-NR-r16

A.8.4.2.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements when UE is configured with *highSpeedInterRAT-NR-r16*.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.9.1-1, A.8.4.2.9.1-2, A.8.4.2.9.1-3 and A.8.4.2.9.1-4.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.9.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1 for UE configured with highSpeedInterRAT-NR-r16

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.8.4.2.9.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

Parameter	Unit	Test configuration	Value	Comment
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2	NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1	E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2	SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0	
CP length		1, 2, 3, 4, 5, 6	Normal	
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0	
Filter coefficient		1, 2, 3, 4, 5, 6	0	L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX.6	As specified in clause A.3.3
Time offset between serving and neighbour cells		1, 4	3ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs	Synchronous cells.

T1	s	1, 2, 3, 4, 5, 6	5	
T2	s	1, 2, 3, 4, 5, 6	5	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.9.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.9.1-4				

Table A.8.4.2.9.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting with NR neigbour cell in FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration[Note1]		4, 5, 6	6	
TDD uplink-downlink configuration[Note1]		4, 5, 6	1	
$BW_{channel}$	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	

b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77	
PBCH_RA	dB	1, 2, 3, 4, 5, 6	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA Note3				
OCNG_RB Note3				
N_{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	17	17
$\hat{E}_s/I_{ot}$ Note5	dB	1, 2, 3, 4, 5, 6	17	17
RSRP Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RP Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io Note5	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].				

Table A.8.4.2.9.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection for UE configured with highSpeedInterRAT-NR-r16

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	FDD	
		2, 3, 5, 6	TDD	
TDD configuration		2, 5	TDDConf.1.1	
		3, 6	TDDConf.2.1	
$BW_{channel}$	MHz	1, 2, 4, 5	10: $N_{RB,c}$ = 52	
		3, 6	40: $N_{RB,c}$ = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 4	SMTC.2	
		2, 3, 5, 6	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	15	
		3, 6	30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-101	
		3, 6	-98	

EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
N_{oc} Note2	dBm/SCS	1, 2, 4, 5	-98	
		3, 6	-95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io Note3	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MHz	3, 6	-63.95	-56.16
Propagation Condition		1, 2, 4, 5	AWGN1944	
		3,6	AWGN3334	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2 Low	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				

A.8.4.2.9.2 Test Requirements

The UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 4.8s from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.5 Measurement performance

A.8.5.1 SFTD accuracy

A.8.5.1.1 SFTD accuracy

A.8.5.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for inter-RAT FR1 SFTD measurements.

A.8.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.8.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR FR1 target cell. The test parameters of cell 1 are given in clause A.8.5.1.1.2-2. The test parameters of cell 2 are given in Table A.8.5.1.1.2-3. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.8.5.1.1.2-4.

Table A.8.5.1.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.5.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Unit	Test 1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration Note1		6
TDD uplink-downlink configuration Note1		1
$BW_{channel}$		5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100
PDSCH parameters: DL Reference Measurement Channel Note2		5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD 5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel Note2		5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD 5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD
OCNG Patterns Note2		5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD 5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD
PBCH_RA	dB	0
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA Note3	dB	
OCNG_RB Note3	dB	
N_{oc} Note4	dBm/15 kHz	-104
$\hat{E}_s/N_{oc}$	dB	-3
$\hat{E}_s/I_{ot}$	dB	-3
RSRP Note5	dBm/15 kHz	-107
SCH_RP Note5	dBm/15 kHz	-107
Io Note5	dBm/Ch BW	-74.45 +10log ($N_{RB,c}$ /50)
Propagation Condition		AWGN
Antenna Configuration		1x2

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.5.1.1.2-3: Test parameters for SFTD accuracy (Cell 2)

Parameter		Config	Unit	Test 1
SSB GSCN		1~6		freq1
Duplex mode		1,4		FDD
		2,5		TDD
		3,6		TDD
TDD Configuration		1,4		N/A
		2,5		TDDConf.1.1
		3,6		TDDConf.2.1
$BW_{channel}$		1,4	MHz	10: $N_{RB,c}$ = 52
		2,5		10: $N_{RB,c}$ = 52
		3,6		40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel		1,4		SR.1.1 FDD
		2,5		SR.1.1 TDD
		3,6		SR.2.1 TDD
RMSI CORESET Reference Channel		1,4		CR.1.1 FDD
		2,5		CR.1.1 TDD
		3,6		CR.2.1 TDD
RMC CORESET Reference Channel		1,4		CCR.1.1 FDD
		2,5		CCR.1.1 TDD
		3,6		CCR.2.1 TDD
SSB configuration		1,4		SSB.1 FR1
		2,5		SSB.1 FR1
		3,6		SSB.2 FR1
SMTC configuration		1~6		SMTC.1
DL BWP configuration		1~6		DLBWP.1.1
UL BWP configuration		1~6		ULBWP.1.1
OCNG Patterns		1~6		OP.1
EPRE ratio of PSS to SSS		1~6	dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~6	dBm/15kHz	-104
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2,4,5	dBm/SSB SCS	-104
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			

	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3,6		-101
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
$\hat{E}_s/I_{ot}$		1~6	dB	-3
$\hat{E}_s/N_{oc}$		1~6	dB	-3
SS-RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2,4,5	dBm/SCS	-107
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3,6		-104
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2,4,5	dBm/9.36 MHz	-74.28
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	3,6	dBm/38.16 MHz	-68.18
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D, NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR_TDD_FR1_E			

	NR_FDD_FR1_F NR_FDD_FR1_G NR_FDD_FR1_H			
Propagation condition		1~6		AWGN
Antenna configuration		1~6		1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification				

Table A.8.5.1.1.2-4: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.8.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.8.5.2 E-UTRA – NR Inter-RAT Measurement Performance requirements

A.8.5.2.1 SS-RSRP

A.8.5.2.1.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR1 SS-RSRP measurements.

A.8.5.2.1.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.1.1.2-2.

Table A.8.5.2.1.1.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.5.2.1.1.2-2: SS-RSRP inter-RAT test parameters

Parameter	Unit	Test 1	Test 2
		Cell 2	Cell 2

SSB ARFCN				freq1		freq1	
Duplex mode		Config 1,4		FDD			
		Config 2,3,5,6		TDD			
TDD configuration		Config 1,4		Not Applicable			
		Config 2,5		TDDConf.1.1			
		Config 3,6		TDDConf.2.1			
Downlink initial BWP configuration				DLBWP.0.1			
Uplink initial BWP configuration				ULBWP.0.1			
DRX Cycle configuration			ms	Not Applicable			
PDSCH Reference measurement channel		Config 1,4		-		-	
		Config 2,5					
		Config 3,6					
RMSI CORESET Reference Channel		Config 1,4		-		-	
		Config 2,5					
		Config 3,6					
Dedicated CORESET Reference Channel		Config 1,4		-		-	
		Config 2,5					
		Config 3,6					
OCNG Patterns				OP.1			
SS-RSSI-Measurement				Not Applicable			
SMTC configruation				SMTC.1			
SSB configuration		Config 1,2,4,5		SSB.1 FR1			
		Config 3,6		SSB.2 FR1			
PDSCH/PDCCH subcarrier spacing		Config 1,2,4,5	kHz	15			
		Config 3,6		30			
EPRE ratio of PSS to SSS			dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2	Config 1,2,3,4,5,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-94.65		-117	
		NR_FDD_FR1_B				-116.5	
		NR_TDD_FR1_C				-116	
		NR_FDD_FR1_D NR_TDD_FR1_D				-115.5	
		NR_FDD_FR1_E NR_TDD_FR1_E				-115	
		NR_FDD_FR1_F				-114.5	
		NR_FDD_FR1_G				-114	
		NR_FDD_FR1_H				-113.5	
N_{oc} Note2	Config 1,2,4,5		dBm/SCS	-94.65		Same as Noc for 15kHz	
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-91.65		-114	
		NR_FDD_FR1_B				-113.5	
		NR_TDD_FR1_C				-113	
		NR_FDD_FR1_D NR_TDD_FR1_D				-112.5	
		NR_FDD_FR1_E				-112	

		NR_TDD_FR1_E			
		NR_FDD_FR1_F			-111.5
		NR_FDD_FR1_G			-111
		NR_FDD_FR1_H			-110.5
$\hat{E}_s/I_{ot}$			dB	10	-4
$\hat{E}_s/N_{oc}$			dB	10	-4
SS-RSRP Note3	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-84.65	-121
		NR_FDD_FR1_B			-120.5
		NR_TDD_FR1_C			-120
		NR_FDD_FR1_D NR_TDD_FR1_D			-119.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-119
		NR_FDD_FR1_F			-118.5
		NR_FDD_FR1_G			-118
		NR_FDD_FR1_H			-117.5
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-81.65	-118
		NR_FDD_FR1_B			-117.5
		NR_TDD_FR1_C			-117
		NR_FDD_FR1_D NR_TDD_FR1_D			-116.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-116
		NR_FDD_FR1_F			-115.5
		NR_FDD_FR1_G			-115
		NR_FDD_FR1_H			-114.5
Io Note3	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-56.28	-87.76
		NR_FDD_FR1_B			-87.26
		NR_TDD_FR1_C			-86.76
		NR_FDD_FR1_D NR_TDD_FR1_D			-86.26
		NR_FDD_FR1_E NR_TDD_FR1_E			-85.76
		NR_FDD_FR1_F			-85.26
		NR_FDD_FR1_G			-84.76
		NR_FDD_FR1_H			-84.26
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	-50.19	-84.76
		NR_FDD_FR1_B			-84.26
		NR_TDD_FR1_C			-83.76
		NR_FDD_FR1_D NR_TDD_FR1_D			-83.26
		NR_FDD_FR1_E NR_TDD_FR1_E			-82.76
		NR_FDD_FR1_F			-82.26
		NR_FDD_FR1_G			-81.76
		NR_FDD_FR1_H			-81.26
Propagation condition			-	AWGN	
Antenna configuration			-	1x2	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.					
Note 2: Interference from other cells and noise sources not specified in the test is assumed to					

	be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	NR operating band groups are as defined in clause 3.5.2.
Note 6:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.8.5.2.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.1.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR2 SS-RSRP measurements.

A.8.5.2.1.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-RSRP inter-RAT measurement are tested by using test setup in Table A.8.5.2.1.2.2-2 and Table A.8.5.2.1.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.1.2.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.1.2.2-2: SS-RSRP Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2
		Cell 2	**Cell 2**
SSB ARFCN		Freq1	freq1
Duplex mode		TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
Downlink initial BWP configuration		DLBWP.0.1	
Uplink initial BWP configuration		ULBWP.0.1	
DRX cycle configuration	ms	Not applicable	
PDSCH Reference measurement channel		-	-
RMSI CORESET Reference Channel		-	-
OCNG Patterns		OP.1	OP.1
SMTC configuration		SMTC.1	SMTC.1
SSB configuration		SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120
EPRE ratio of PSS to SSS	dB	0	0
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS			
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void			

Table A.8.5.2.1.2.2-3: SS-RSRP Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2
		Cell 2	Cell 2
Angle of arrival configuration		Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1
Assumption for UE beams Note 10		Rough	Rough
N_{oc} Note1	dBm/15kHz Note4	-105	N/A
N_{oc} Note1	dBm/SCS Note4	-96	N/A
Es	dBm/SCS Note4		(Table B.2.3-2 Rx Beam Peak +1dB) (Note 7)
$\hat{E}_s/N_{oc}$	dB	11	N/A
SSB_RP Note2	dBm/SCS Note4	-85	(Table B.2.3-2 Rx Beam Peak +1dB) (Note 7)
$\hat{E}_s/I_{ot\ BB}$ Note 2, Note 9	dB	9.97	-3.81
Io Note2	dBm/95.04 MHz Note4	-55.65	(Table B.2.3-2 Rx Beam Peak +30dB) (Note 8)

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SSB_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Void
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
Note 5: Void
Note 6: Void
Note 7: SSB_RP is applied at 1dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 8: Io is applied at $10\log_{10}(792)$dB+1dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 9: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.8.5.2.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.2 SS-RSRQ

A.8.5.2.2.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR1 SS-RSRQ measurements.

A.8.5.2.2.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.2.1.2-2.

Table A.8.5.2.2.1.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.5.2.2.1.2-2: SS-RSRQ inter-RAT test parameters

Parameter	Unit	Test 1	Test 2	Test 3
		Cell 2	Cell 2	Cell 2

SSB ARFCN				freq1		freq1		freq1	
Duplex mode	Config 1,4			FDD					
	Config 2,3,5,6			TDD					
TDD configuration	Config 1,4			Not Applicable					
	Config 2,5			TDDConf.1.1					
	Config 3,6			TDDConf.2.1					
Downlink initial BWP configuration				DLBWP.0.1					
Uplink initial BWP configuration				ULBWP.0.1					
DRX Cycle configuration			ms	Not Applicable					
PDSCH Reference measurement channel	Config 1,4			-		-		-	
	Config 2,5								
	Config 3,6								
RMSI CORESET Reference Channel	Config 1,4			-		-		-	
	Config 2,5								
	Config 3,6								
Dedicated CORESET Reference Channel	Config 1,4			-		-		-	
	Config 2,5								
	Config 3,6								
OCNG Patterns				OP.1					
SS-RSSI-Measurement				Not Applicable					
SMTC configuration				SMTC.1					
SSB configuration	Config 1,2,4,5			SSB.1 FR1					
	Config 3,6			SSB.2 FR1					
PDSCH/PDCCH subcarrier spacing	Config 1,2,4,5		kHz	15					
	Config 3,6			30					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-80.18		-106		-116	
		NR_FDD_FR1_B						-115.5	
		NR_TDD_FR1_C						-115	
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	
		NR_FDD_FR1_F						-113.5	
		NR_FDD_FR1_G						-113	
		NR_FDD_FR1_H						-112.5	
	Config 3,6			-86.27		-113		Same as Noc for Config 1,2,4,5	
N_{oc} Note2	Config 1,2,4,5		dBm/SCS	-80.18		-106		Same as Noc for 15kHz	
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-83.27		-110		-113	
		NR_FDD_FR1_B						-112.5	
		NR_TDD_FR1_C						-112	

		NR_FDD_FR1_D NR_TDD_FR1_D				-111.5
		NR_FDD_FR1_E NR_TDD_FR1_E				-111
		NR_FDD_FR1_F				-110.5
		NR_FDD_FR1_G				-110
		NR_FDD_FR1_H				-109.5
$\hat{E}_s/I_{ot}$			dB	-1.75	-1.75	-1.75
$\hat{E}_s/N_{oc}$			dB	-1.75	-1.75	-1.75
SS-RSRP Note3	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-81.93	-107.75	-117.75
		NR_FDD_FR1_B				-117.25
		NR_TDD_FR1_C				-116.75
		NR_FDD_FR1_D NR_TDD_FR1_D				-116.25
		NR_FDD_FR1_E NR_TDD_FR1_E				-115.75
		NR_FDD_FR1_F				-115.25
		NR_FDD_FR1_G				-114.75
		NR_FDD_FR1_H				-114.25
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-85.02	-111.75	-114.75
		NR_FDD_FR1_B				-114.25
		NR_TDD_FR1_C				-113.75
		NR_FDD_FR1_D NR_TDD_FR1_D				-113.25
		NR_FDD_FR1_E NR_TDD_FR1_E				-112.75
		NR_FDD_FR1_F				-112.25
		NR_FDD_FR1_G				-111.75
		NR_FDD_FR1_H				-111.25
SS-RSRQ Note3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dB	-14.77	-40.59	-14.76
		NR_FDD_FR1_B				
		NR_TDD_FR1_C				
		NR_FDD_FR1_D NR_TDD_FR1_D				
		NR_FDD_FR1_E NR_TDD_FR1_E				
		NR_FDD_FR1_F				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
Io Note3	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/9.36MHz	-50	-75.83	-85.83
		NR_FDD_FR1_B				-85.33
		NR_TDD_FR1_C				-84.83
		NR_FDD_FR1_D NR_TDD_FR1_D				-84.33
		NR_FDD_FR1_E NR_TDD_FR1_E				-83.83
		NR_FDD_FR1_F				-83.33
		NR_FDD_FR1_G				-82.83
		NR_FDD_FR1_H				-82.33
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A	dBm/38.16MH	-50	-76.73	-79.73

		NOTE 6	z			
		NR_FDD_FR1_B				-79.23
		NR_TDD_FR1_C				-78.73
		NR_FDD_FR1_D NR_TDD_FR1_D				-78.23
		NR_FDD_FR1_E NR_TDD_FR1_E				-77.73
		NR_FDD_FR1_F				-77.23
		NR_FDD_FR1_G				-76.73
		NR_FDD_FR1_H				-76.53
Propagation condition			-	AWGN		
Antenna configuration			-	1x2		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: NR operating band groups are as defined in clause 3.5.2. Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.						

A.8.5.2.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

A.8.5.2.2.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR2 SS-RSRQ measurements.

A.8.5.2.2.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-RSRQ inter-RAT measurement are tested by using test setup in Table A.8.5.2.2.2.2-2 and Table A.8.5.2.2.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.2.2.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.2.2.2-2: SS-RSRQ Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2
		Cell 2	**Cell 2**
SSB ARFCN		Freq1	freq1
Duplex mode		TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
Downlink initial BWP configuration		DLBWP.0.1	
Uplink initial BWP configuration		ULBWP.0.1	
DRX cycle configuration	ms	Not applicable	
PDSCH Reference measurement channel		-	-
RMSI CORESET Reference Channel		-	-
OCNG Patterns		OP.1	OP.1
SMTC configuration		SMTC.1	SMTC.1
SSB configuration		SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120
EPRE ratio of PSS to SSS	dB	0	0
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS			
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS[Note 1]			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void			

Table A.8.5.2.2.2.2-3: SS-RSRQ Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2
		Cell 2	Cell 2
Angle of arrival configuration		Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1
Assumption for UE beams Note 10		Rough	Rough
N_{oc} Note1	dBm/15kHz Note4	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB) (Note 7)
N_{oc} Note1	dBm/SCS Note4	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)
$\hat{E}_s/N_{oc}$	dB	-0.5	-1.75
SSB_RP Note2	dBm/SCS Note4	-96.2	(Table B.2.3-2 Rx Beam Peak +2.25dB) (Note 8)
SS-RSRQ Note2	dB	-3.27	-14.82
$\hat{E}_s/I_{ot}$ Note2	dB	-0.5	-1.75
Io Note2	dBm/95.04 MHz Note4	-63.95	(Table B.2.3-2 Rx Beam Peak +35.22dB) (Note 9)

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SSB_RP, SS-RSRQ, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Void
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
Note 5: Void
Note 6: Void
Note 7: N_{oc} for SCS 15kHz is applied at -10log$_{10}$(8)+4dB above the minimum level specified in Table B.2.3-2 for beam peak. N_{oc} for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 8: SSB_RP is applied at 2.25dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 9: Io is applied at 10log$_{10}$(792)+6.22dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.8.5.2.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

In this test case there are two cells on different carriers and measurement gaps are provided

A.8.5.2.3 SS-SINR

A.8.5.2.3.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR1 SS-SINR measurements.

A.8.5.2.3.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.3.1.2-2.

Table A.8.5.2.3.1.2-1: SS- SINR Inter-RAT SS- SINR supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.8.5.2.3.1.2-2: SS-SINR inter-RAT test parameters

Parameter	Unit	Test 1	Test 2	Test 3
		Cell 2	Cell 2	Cell 2

SSB ARFCN				freq1		freq1		freq1	
Duplex mode	Config 1,4			FDD					
	Config 2,3,5,6			TDD					
TDD configuration	Config 1,4			Not Applicable					
	Config 2,5			TDDConf.1.1					
	Config 3,6			TDDConf.2.1					
Downlink initial BWP configuration				DLBWP.0.1					
Uplink initial BWP configuration				ULBWP.0.1					
DRX Cycle configuration			ms	Not Applicable					
PDSCH Reference measurement channel	Config 1,4			-		-		-	
	Config 2,5								
	Config 3,6								
RMSI CORESET Reference Channel	Config 1,4			-		-		-	
	Config 2,5								
	Config 3,6								
Dedicated CORESET Reference Channel	Config 1,4			-		-		-	
	Config 2,5								
	Config 3,6								
OCNG Patterns				OP.1					
SS-RSSI-Measurement				Not Applicable					
SMTC configuration				SMTC.1					
SSB configuration	Config 1,2,4,5			SSB.1 FR1					
	Config 3,6			SSB.2 FR1					
PDSCH/PDCCH subcarrier spacing	Config 1,2,4,5		kHz	15					
	Config 3,6			30					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS (Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz	-880		-108.5		-119.5	
		NR_FDD_FR1_B						-119	
		NR_TDD_FR1_C						-118.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-118	
		NR_FDD_FR1_E NR_TDD_FR1_E						-117.5	
		NR_FDD_FR1_F						-117	
		NR_FDD_FR1_G						-116.5	
		NR_FDD_FR1_H						-116	
N_{oc} Note2	Config 1,2,4,5		dBm/SCS	[-80]		-88		-108.5	
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-85		-105.5		-116.5	
		NR_FDD_FR1_B						-116	
		NR_TDD_FR1_C						-115.5	
		NR_FDD_FR1_D NR_TDD_FR1_D						-115	
		NR_FDD_FR1_E						-114.5	

		NR_TDD_FR1_E				
		NR_FDD_FR1_F				-114
		NR_FDD_FR1_G				-114.5
		NR_FDD_FR1_H				-113]
$\hat{E}_s/I_{ot}$			dB	-1.75	20	-4.0
$\hat{E}_s/N_{oc}$			dB	-1.75	20	-4.0
SS-RSRP[Note3]	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS	-89.75	-88.5	-123.5
		NR_FDD_FR1_B				-123
		NR_TDD_FR1_C				-122.5
		NR_FDD_FR1_D NR_TDD_FR1_D				-122
		NR_FDD_FR1_E NR_TDD_FR1_E				-121.5
		NR_FDD_FR1_F				-121
		NR_FDD_FR1_G				-120.5
		NR_FDD_FR1_H				-120
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-86.75	-85.5	-120.5
		NR_FDD_FR1_B				-120
		NR_TDD_FR1_C				-119.5
		NR_FDD_FR1_D NR_TDD_FR1_D				-119
		NR_FDD_FR1_E NR_TDD_FR1_E				-118.5
		NR_FDD_FR1_F				-118
		NR_FDD_FR1_G				-117.5
		NR_FDD_FR1_H				-117
SS-SINR [Note3]		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dB	-1.75	20	-4.0
		NR_FDD_FR1_B				
		NR_TDD_FR1_C				
		NR_FDD_FR1_D NR_TDD_FR1_D				
		NR_FDD_FR1_E NR_TDD_FR1_E				
		NR_FDD_FR1_F				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
Io[Note3]	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 9.36MHz	-57.83	-60.5	-90.09
		NR_FDD_FR1_B				-89.59
		NR_TDD_FR1_C				-89.09
		NR_FDD_FR1_D NR_TDD_FR1_D				-88.59
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09
		NR_FDD_FR1_F				-87.59
		NR_FDD_FR1_G				-87.09
		NR_FDD_FR1_H				-86.59
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	-51.73	-54.41	-84
		NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C				-83

		NR_FDD_FR1_D NR_TDD_FR1_D			-82.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-82
		NR_FDD_FR1_F			-81.5
		NR_FDD_FR1_G			-81
		NR_FDD_FR1_H			-80.5
Propagation condition			-	AWGN	
Antenna configuration			-	1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: NR operating band groups are as defined in clause 3.5.2.
Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.8.5.2.3.1.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

A.8.5.2.3.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR2 SS-SINR measurements.

A.8.5.2.3.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-SINR inter-RAT measurement are tested by using test setup in Table A.8.5.2.3.2.2-2 and A.8.5.2.3.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.3.2.2-1: SS-SINR Inter-RAT SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.3.2.2-2: SS-SINR Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	Test 3
		Cell 2	Cell 2	Cell 2
SSB ARFCN		Freq1	freq1	freq1
Duplex mode		TDD	TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1	TDDConf.3.1
$BW_{channel}$	MHz	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66	100: $N_{RB,c}$ = 66
Downlink initial BWP configuration		DLBWP.0.1		
Uplink initial BWP configuration		ULBWP.0.1		
DRX cycle configuration	ms	Not applicable		
PDSCH Reference measurement channel		-	-	-
RMSI CORESET Reference Channel		-	-	-
OCNG Patterns		OP.1	OP.1	OP.1
SMTC configuration		SMTC.1	SMTC.1	SMTC.1
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS				
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void Note 3: Void Note 4: Void				

Table A.8.5.2.3.2.2-3: SS-SINR Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2	Test 3
		Cell 2	Cell 2	Cell 2
Angle of arrival configuration		Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1
Assumption for UE beams Note 10		Rough	Rough	Rough
N_{oc} Note1	dBm/15kHz Note4	-104.7	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB) (Note 7)
N_{oc} Note1	dBm/SCS Note4	-95.7	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)
$\hat{E}_s/N_{oc}$	dB	-0.5	11	-1.0
SSB_RP Note2	dBm/SCS Note4	-96. 2	-84.7	(Table B.2.3-2 Rx Beam Peak +3dB) (Note 8)
SS-SINR Note2	dB	-0.5	11	-1.0
$\hat{E}_s/I_{ot}$ Note2	dB	-0.5	11	-1.0
Io Note2	dBm/95.04 MHz Note4	-63.95	-55.38	(Table B.2.3-2 Rx Beam Peak +35.54dB) (Note 9)

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: SSB_RP, SS-SINR, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: Void
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.
Note 5: Void
Note 6: Void
Note 7: N_{oc} for SCS 15kHz is applied at $-10\log_{10}(8)$+4dB above the minimum level specified in Table B.2.3-2 for beam peak. N_{oc} for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 8: SSB_RP is applied at 3dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 9: Io is applied at level $10\log_{10}(792)$+6.54dB above the minimum level specified in Table B.2.3-2 for beam peak.
Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.8.5.2.3.2.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

A.9 V2X Tests

A.9.1 V2X Tests in FR1

A.9.1.1 Test for V2X UE Transmit Timing

A.9.1.1.1 Test for GNSS as Synchronization Reference Source

A.9.1.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE timing requirements as specified in clause 12.2.2, when the GNSS is used as timing reference. For this test, the UE is triggered by the test loop function to transmit for V2X sidelink communication.

Table A.9.1.1.1.1-1 defines test parameters for UE transmit timing accuracy tests for V2X. There is one GNSS based synchronization source during the test. The test system can emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in B.4.1.

Table A.9.1.1.1.1-1: V2X Sidelink Test Parameters for UE Transmit Timing Tests for GNSS as Timing Reference

Parameter	Unit	Value	Comment
RF Channel Number		1	TDD carrier in Band n47 or n38
Channel Bandwidth ($BW_{channel}$) Note 1	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
Active cell		None	
Active SyncRef UE		None	
V2X sidelink communication preconfiguration		As specified in section A.3.21.2	IE values unless specified otherwise in this test.
PSCCH Reference Measurement Channel		CC.1A HD	As specified in Table A.3.21.3-1
PSSCH Reference Measurement Channel		CD.1A HD	As specified in Table A.3.21.3-2
Propagation condition		AWGN	
Note 1: The UE is only required to be tested in one of the supported test configurations.			

A.9.1.1.1.2 Test requirements

For parameters specified in Tables A.9.1.1.1-1, the timing accuracy for V2X sidelink transmission shall be within the limits defined in clause 12.2.2. The timing accuracy is verified by using PSSCH transmissions.

A.9.1.1.2 Test for SyncRef UE as Synchronization Reference Source

A.9.1.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for V2X sidelink transmissions specified in clause 12.2.5, when SyncRef UE is used as timing reference. For this test, the UE is triggered by the test loop function to transmit for V2X sidelink communication.

Table A.9.1.1.2.1-1 defines test parameters for UE transmit timing accuracy tests for V2X sidelink Communication. There is one active SyncRef UE in this test without either serving cell and or GNSS signals. Before the test starts, the UE has been synchronized to the SyncRef UE. The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions.

Table A.9.1.1.2.1-1: General Test Parameters for V2X UE Transmit Timing Test for SyncRef UE as Timing Reference

Parameter		Unit	Value	Comment
RF Channel Number			1	TDD carrier in Band n47 or n38
Channel Bandwidth ($BW_{channel}$) Note 3		MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
Active cell			None	
Active SyncRef UE			SyncRef UE 1	Transmitting SLSS+MIB-SL on uplink of RF channel number 1
V2X sidelink communication preconfiguration			As specified in section A.3.21.2	IE values unless specified otherwise in this test.
PSCCH Reference Measurement Channel			CC.1A HD	As specified in Table A.3.21.3-1
PSSCH Reference Measurement Channel			CD.1A HD	As specified in Table A.3.21.3-2
N_{oc} Note1,2		dBm/30kHz	-95	
SyncRef UE 1	sl-SSB-TimeAllocation		sl-SSB-TimeAllocation1	
	slssid		30	
	inCoverage		TRUE	In MIB-SL
	networkControlledSyncTx		ON	
	V2X sidelink communication configuration		As specified in section A.3.21.2	IE values unless specified otherwise in this test.
	$\hat{E}_s/N_{oc}$		3	
	PSBCH-RSRP Note1, Note 2	dBm/30kHz	-92	
Propagation condition			AWGN	

Note 1: PSBCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: PSSSS E_s/N_{oc} and PSPSS E_s/N_{oc} are set the same as PSBCH E_s/N_{oc}.
Note 3: The UE is only required to be tested in one of the supported test configurations.

A.9.1.1.2.2 Test requirements

For parameters specified in Tables A.9.1.1.2.1-1, the timing accuracy for V2X sidelink transmission shall be within the limits defined in clause 12.2.5. The timing accuracy is verified by using PSSCH transmissions.

A.9.1.1.3 Test for FR1 NR Cell as Synchronization Reference Source

A.9.1.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for V2X sidelink transmissions specified in clause 12.2.3, when the downlink timing of the serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) on a non-V2X sidelink carrier is used as timing reference. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink communication.

This test is applicable for V2X sidelink communication capable UEs that support NR Uu and sidelink operation.

Table A.9.1.1.3.1-1, A.9.1.1.3.1-2 and A.9.1.1.3.1-3 define test parameters for UE transmit timing accuracy tests for V2X sidelink Communication. There is one active cell (PCell) in this test. The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions.

Table A.9.1.1.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.9.1.1.3.1-2: V2X Sidelink Test Parameters for V2X UE Transmit Timing Accuracy Test for gNB as Timing Reference

Parameter	Unit	Value	Comment
RF Channel Number		1	TDD carrier in Band n47 or n38
Channel Bandwidth ($BW_{channel}$) Note 1	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
Active cell		Cell 1	
Active SyncRef UE		None	
V2X sidelink communication configuration		As specified in section A.3.21.2	IE values unless specified otherwise in this test.
PSCCH Reference Measurement Channel		CC.1A HD	As specified in Table A.3.21.3-1
PSSCH Reference Measurement Channel		CD.1A HD	As specified in Table A.3.21.3-2
Note 1: The UE is only required to be tested in one of the supported test configurations.			

Table A.9.1.1.3.1-3: Cell Test Parameters for V2X UE Transmit Timing Accuracy Test for gNB as Timing Reference

Parameter		Unit	Cell 1
RF Channel Number			2
Duplex Mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
Channel Bandwidth ($BW_{channel}$)	Config 1,2	MHz	10: $N_{RB,c}$ = 52
	Config 3		40: $N_{RB,c}$ = 106
Initial BWP Configuration			DLBWP.0.1 ULBWP.0.1
Dedicated BWP Configuration			DLBWP.1.1 ULBWP.1.1
DRX Cycle			N/A
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD
	Config 2		SR.1.1 TDD
	Config 3		SR.2.1 TDD
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB configuration	Config 1,2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration			SMTC.2
OCNG Patterns			OP.1
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
N_{oc} Note2	Config 1,2,3	dBm/15 kHz	-98
N_{oc} Note2	Config 1,2	dBm/SCS	-98
	Config 3		-95
$\hat{E}_s/N_{oc}$		dB	3
SS-RSRP Note3	Config 1,2	dBm/SCS	-95
	Config 3		-92
Io Note 3	Config 1,2	dBm/9.36 MHz	-65.2
	Config 3	dBm/38.1 MHz	-59.2
Propagation Condition			AWGN

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.9.1.1.3.2 Test requirements

For parameters specified in Tables A.9.1.1.3.1-1 A.9.1.1.3.1-2 and A.9.1.1.3.1-3, the timing accuracy for V2X sidelink transmission shall be within the limits defined in clause 12.2.3. The timing accuracy is verified by using PSSCH transmissions.

A.9.1.2 Test for Initiation/Cease of SLSS Transmission with V2X Sidelink Communication

A.9.1.2.1 Test for FR1 NR Cell as synchronization reference source without gap under non-DRX

A.9.1.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the V2X UE meets the requirements related to the maximum evaluation time allowed to initiate and cease SLSS transmissions defined in clause 12.3.1.1, when the reference timing used for sidelink transmissions is a NR serving cell in FR1 on a non-V2X sidelink carrier. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink communication.

This test is applicable for V2X sidelink communication capable UEs that support NR Uu and sidelink operation.

Supported test configurations for FR1 NR cell are shown in Table A.9.1.2.1.1-1.

Table A.9.1.2.1.1-1: Supported Test Configurations for FR1 NR cell as synchronization reference source

Configuration	Description
1	NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to pass in one of the supported test configurations in FR1. Note 2: For NR SL, SL BW is one between 20MHz and 40MHz, and SL SCS is 30kHz.	

The test parameters are given in Table A.9.1.2.1.1-2 and Table A.9.1.2.1.1-3 below. There is one active cell in this test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the SS-RSRP of the PCell is above *syncTxThreshIC* and the UE is not expected to be transmitting SLSS.

During T2, the SS-RSRP of the PCell is lowered below *syncTxThreshIC* and the UE is expected to initiate SLSS transmissions.

During T3, the SS-RSRP of the PCell is increased back to be above *syncTxThreshIC* and the UE is expected to cease SLSS transmissions.

Table A.9.1.2.1.1-2: Test Parameters for Initiation/Cease of SLSS Transmission Test for FR1 NR cell as synchronization reference source

Parameter	Unit	Value	Comment
Active cell		Cell 1	Serving cell on RF channel number 1
Active SyncRef UE		None	
Active V2X UE		V2X UE	Transmitting SLSS+MIB-SL on RF channel number 2(TDD carrier in Band n47 or n38)
V2X sidelink communication configuration		As specified in Table A.3.21.2-2	IE values unless specified otherwise in this test
networkControlledSyncTx		Not configured	
syncTxThreshIC	dBm/SCS	-110	In SIB12
DRX		OFF	
T1	s	3	
T2	s	5.24	
T3	s	5.24	

Table A.9.1.2.1.1-3: FR1 NR Cell Specific Test Parameters for Initiation/Cease of SLSS Transmission Test for FR1 NR cell as synchronization reference source

Parameter		Unit	Cell1		
			T1	T2	T3
NR RF Channel Number			1		
Duplex Mode	Config 1		FDD		
	Config 2,3		TDD		
TDD configuration	Config 1		Not applicable		
	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
Channel Bandwidth ($BW_{channel}$)	Config 1,2	MHz	10:$N_{RB,c}$ = 52		
	Config 3		40:$N_{RB,c}$ = 106		
Initial BWP Configuration			DLBWP.0.1 ULBWP.0.1		
Dedicated BWP Configuration			DLBWP.1.1 ULBWP.1.1		
DRx Cycle		ms	N/A		
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD		
	Config 2		SR.1.1 TDD		
	Config 3		SR.2.1 TDD		
CORESET Reference Channel	Config 1		CR.1.1 FDD		
	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD		
	Config 2		CCR.1.1 TDD		
	Config 3		CCR.2.1 TDD		
SSB configuration	Config 1,2		SSB.1 FR1		
	Config 3		SSB.2 FR1		
SMTC Configuration	Config 1		SMTC.2		
	Config 2,3		SMTC.1		
TRS configuration	Config 1		TRS.1.1 FDD		
	Config 2		TRS.1.1 TDD		
	Config 3		TRS.1.2 TDD		
OCNG Patterns			OP.1		
EPRE ratio of PSS to SSS		dB	0		

EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
N_{oc} Note2	Config 1,2,3	dBm/15 kHz	-110		
	Config 1,2	dBm /SCS	-110		
	Config 3		-107		
$\hat{E}_s/N_{oc}$		dB	4.5	-4.5	4.5
$\hat{E}_s/I_{ot}$		dB	4.5	-4.5	4.5
SS-RSRP Note3	Config 1,2	dBm /SCS	-105.5	-114.5	-105.5
	Config 3		-102.5	-111.5	-102.5
Io Note3	Config 1,2	dBm /9.36MHz	-76.2	-80.7	-76.2
	Config 3	dBm/ 38.16MHz	-70.1	-74.6	-70.1
Propagation condition			AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.					

A.9.1.2.1.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 0.56 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 0.56 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + SLSS period,

Where:

- $T_{evaluate,SLSS}$ = 0.4 sec (as specified in clause 12.3.1.1);
- SLSS period = 160ms.

A.9.1.2.2 Test for SyncRef UE as synchronization reference source

A.9.1.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to the evaluation time allowed to initiate and cease SLSS transmissions defined in clause 12.3.1.4, when the reference timing used for sidelink transmissions is a

SyncRef UE. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink communication.

The test parameters are given in Table A.9.1.2.2.1-1 and Table A.9.1.2.2.1-2 below. There are neither active cells nor GNSS signals in this test. There is one active SyncRef UE (SyncRef UE 1) in this test. The test system shall emulate SyncRef UE 1 to transmit SLSS and MIB-SL every synchronization period.

Prior to start of test, test system is required to ensure that the V2X UE is synchronized to the SyncRef UE 1 and is transmitting SLSS + MIB-SL as derived from the SLSS + MIB-SL of SyncRef UE 1 as per clause 5.8.5.3 of TS 38.331[2]. For the test configuration, the SLSSID used by the V2X UE shall be 30 with *inCoverage* IE in MIB-SL set as FALSE. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the PSBCH-RSRP of SyncRef UE 1 is above *syncTxThreshOOC* and the UE is not expected to be transmitting SLSS.

During T2, the PSBCH-RSRP of SyncRef UE 1 is lowered below *syncTxThreshOOC* and the UE is expected to initiate SLSS transmissions.

During T3, the PSBCH-RSRP of SyncRef UE 1 is increased back to be above *syncTxThreshOOC* and the UE is expected to cease SLSS transmissions.

Table A.9.1.2.2.1-1: Test Parameters for Initiation/Cease of SLSS Transmission Test for SyncRef UE as synchronization reference source

Parameter	Unit	Value	Comment
Active cell		None	
Active SyncRef UE		SyncRef UE 1	Transmitting SLSS + MIB-SL on RF channel number 1(TDD carrier in Band n47 or n38)
Active V2X UE		V2X UE	Transmitting SLSS + MIB-SL on RF channel number 1(TDD carrier in Band n47 or n38)
V2X sidelink communication preconfiguration		As specified in Table A.3.21.2-2	IE values unless specified otherwise in this test
networkControlledSyncTx		Not configured	
syncTxThreshOoC	dBm/30kHz	-97	
T1	s	3	
T2	s	5.24	
T3	s	5.24	

Table A.9.1.2.2.1-2: SyncRef UE Specific Test Parameters for Initiation/Cease of SLSS Transmission Test for SyncRef UE as synchronization reference source

Parameter	Unit	Cell1		
		T1	T2	T3
NR RF Channel Number		1		
V2X SL communication resource pool configuration		As specified in Table A.3.21.2-2		
Channel Bandwidth ($BW_{channel}$) Note3	MHz	20($N_{RB,c}$ = 50) or 40($N_{RB,c}$ = 100)		
SLSSID		30		
inCoverage		FALSE		
networkControlledSyncTx		ON		
N_{oc} Note1	dBm/30 kHz	-98		
$\hat{E}_s/I_{ot}$	dB	5.5	-3.5	5.5
PSBCH $\hat{E}_s/N_{oc}$	dB	5.5	-3.5	5.5
PSBCH-RSRP Note2	dBm/30 kHz	-92.5	-101.5	-92.5
Io Note2	dBm /3.96MHz	-70.2	-75.2	-70.2
Propagation condition		AWGN		
Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: PSBCH-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io level is based on the allocated RBs for PSPSS/PSSSS/PSBCH symbols. Note 3: The UE is only required to be tested in one of the supported test configurations. Note 4: PSSSS Es/Noc and PSPSS Es/Noc are set the same as PSBCH Es/Noc.				

A.9.1.2.2.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 0.8 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 0.8 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + SLSS period,

Where:

- $T_{evaluate,SLSS}$ = 0.64 sec (as specified in clause 12.3.1.4);
- SLSS period = 160ms.

A.9.1.3 Test for V2X Synchronization Reference Selection/Reselection

A.9.1.3.1 Test for GNSS configured as the highest priority

A.9.1.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to SyncRef UE selection / reselection defined in clause 12.4, when GNSS is configured as the highest priority. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.9.1.3.1.1-1and A.9.1.3.1.1-2 below. There are no GNSS signals in this test. There are three active SyncRef UEs (SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3) in this test. The test system shall emulate SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3 to transmit SLSS and MIB-SL every SLSS period.

The test system can verify the selection / reselection of SyncRef UE by monitoring the SLSS ID used by the V2X UE for its SLSS+MIB-SL transmissions. When the V2X UE is not synchronized to any SyncRef UE, then the V2X UE shall use the SLSS ID pre-configured in the V2X UE. When the V2X UE is synchronized to a SyncRef UE, the V2X UE shall derive its SLSS ID from the SLSS ID of the SyncRef UE as per clause 5.8.5.3 of TS 38.331[2].

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. SyncRef UE 1, SyncRef UE 2 and SyncRef UE 3 are all powered off before starting the test. During T1, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as synchronization source. During T2, SyncRef UE 2 is powered ON and the V2X UE will select SyncRef UE 2 as the synchronization source. During T3, a higher priority SyncRef UE 3 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.

Table A.9.1.3.1.1-1: Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for GNSS configured as the highest priority

Parameter		Unit	Value	Comment
Initial condition	Active synchronization source		Sync Ref UE 1	UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 30 and in-coverage set as TRUE in MIB-SL.
T2 end condition	Active synchronization source		Sync Ref UE 2	UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 336 and in-coverage set as FALSE in MIB-SL.
Final condition	Active synchronization source		Sync Ref UE 3	UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 0 and in-coverage set as FALSE in MIB-SL.
Active SyncRef UEs			SyncRef UE 1 SyncRef UE 2 SyncRef UE 3	Transmitting SLSS+MIB-SL on RF channel number 1 (TDD carrier in Band n47 or n38)
Timing offset among SyncRef UEs		µs	CP/2	Synchronous
Frequency offset of SyncRef UE 1		ppm	0	
Frequency offset of SyncRef UE 2		ppm	5	
Frequency offset of SyncRef UE 3		ppm	10	
V2X sidelink Communication configuration			As specified in Table A. 3.21.2-2	IE values unless specified otherwise in this test.
typeTxSync			gnss	
slssid			30	
syncTxThreshIC			+infinity	
T1		s	24	
T2		s	16	
T3		s	3.2	

Table A.9.1.3.1.1-2: SyncRef UE Specific Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for GNSS configured as the highest priority

Parameter	Unit	SyncRef UE 1			SyncRef UE 2			SyncRef UE 3		
		T1	T2	T3	T1	T2	T3	T1	T2	T3
NR RF Channel Number		1(TDD carrier in Band n47 or n38)								
SCS	kHz	30								
Channel Bandwidth ($BW_{channel}$) Note 4	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)								
V2X Sidelink Communication resource pool configuration		As specified in Table A.3.21.2-2								
networkControlledSyncTx		N/A			N/A			ON		
syncTxThreshOoC	dBm/15 kHz	+infinity			+infinity			N/A		
slssid		30			336			0		
inCoverage (in MIB-SL)		TRUE			FALSE			FALSE		
N_{oc} Note1	dBm/30 kHz	-95								
$\hat{E}_s/N_{oc}$	dB	3	0	0	-infinity	0	0	-infinity	-infinity	3
$\hat{E}_s/I_{ot}$	dB	0	-4.76	-4.76	-infinity	0	-4.76	-infinity	-infinity	0
PSBCH-RSRP Note2, Note 3	dBm/30 kHz	-92	-95	-95	-infinity	-95	-95	-infinity	-infinity	-92
Propagation Condition		AWGN								

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: PSBCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: PSSSS Es/Iot is set the same as PSPSS/PSBCH Es/Iot.
Note 4: The UE is only required to be tested in one of the supported test configurations.

A.9.1.3.1.2 Test Requirements

1) During T1, SyncRef UE reselection delay is defined as the time from the beginning of T1 to the time UE is synchronized to SyncRef UE 1, and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 1 as the synchronization source. For the test configuration, the SLSS ID will be changed to 30 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T1.

The SyncRef UE reselection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 12.4)
- $T_{evaluate,SLSS}$ = 0.64 sec (as specified in sub-clause 12.3)
- SLSS period = 160ms

This gives a total of 8.8 seconds.

2) During T2, SyncRef UE selection delay is defined as the time from the beginning of T2 to the time UE changes its synchronization source from SyncRef UE 1 to SyncRef UE 2 and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 2 as the synchronization source. For the test configuration, the SLSS ID will be changed to 336 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T2.

The SyncRef UE selection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE} + T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 12.4)
- $T_{evaluate,SLSS}$ = 0.64 (as specified in sub-clause 12.3)
- SLSS period = 160ms

This gives a total of 8.8seconds.

3) During T3, SyncRef UE reselection delay is defined as the time from the beginning of T3 to the time UE changes its synchronization source from SyncRef UE 2 to SyncRef UE 3, and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 3 as the synchronization source. For the test configuration, the SLSS ID will still be 0 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T3.

The SyncRef UE reselection delay shall be less than 2.4sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE} + T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 1.6sec (as specified in sub-clause 12.4)
- $T_{evaluate,SLSS}$ = 0.64 (as specified in sub-clause 12.3)
- SLSS period = 160ms

This gives a total of 2.4seconds.

The test system will verify that the V2X UE does not drop or delay more than 6% of its V2X data and SLSS transmissions during the duration of T2, and does not drop or delay more than 30% of its SLSS transmissions during the duration of T3.

The rate of correct SyncRef UE selection / reselection observed during repeated tests shall be at least 90%.

A.9.1.3.2 Test for FR1 NR Cell configured as the highest priority

A.9.1.3.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to SyncRef UE selection / reselection defined in clause 12.4, when gNB is configured as the highest priority. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

This test is applicable for V2X sidelink communication capable UEs that support gNB as synchronization source and sidelink operation.

Supported test configurations for FR1 NR cell are shown in Table A.9.1.3.2.1-1.

Table A. 9.1.3.2.1-1: Supported Test Configurations for FR1 NR cell

Configuration	Description
1	NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

The test parameters are given in Table A.9.1.3.2.1-2and A.9.1.3.2.1-3 below. There are no active cells and GNSS is reliable during the whole test. The test system can emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in B. 4.1. There are two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test. The test system shall emulate SyncRef UE 1 and SyncRef UE 2 to transmit SLSS and MIB-SL every SLSS period.

The test system can verify the selection / reselection of SyncRef UE by monitoring the SLSS ID used by the V2X UE for its SLSS+MIB-SL transmissions. When the V2X UE is not synchronized to any SyncRef UE, then the V2X UE shall use the SLSS ID pre-configured in the V2X UE. When the V2X UE is synchronized to a SyncRef UE, the V2X UE shall derive its SLSS ID from the SLSS ID of the SyncRef UE as per clause 5.8.5.3 of TS 38.331[2].

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select GNSS as synchronization source. During T2, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source. During T3, a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.

Table A.9.1.3.2.1-2: Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for FR1 NR Cell configured as the highest priority

Parameter		Unit	Value	Comment
Initial condition	Active synchronization source		GNSS	UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 0 and in-coverage set as TRUE in MIB-SL.
T2 end condition	Active synchronization source		Sync Ref UE 1	UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 336+59 and in-coverage set as FALSE in MIB-SL.
Final condition	Active synchronization source		Sync Ref UE 2	UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 30 and in-coverage set as FALSE in MIB-SL.
Active cell			None	
Active SyncRef UEs			SyncRef UE 1 SyncRef UE 2	Transmitting SLSS+MIB-SL on RF channel number 1
Timing offset between SyncRef UE 1 and SyncRef UE 2		ms	3	Asynchronous
Frequency offset of SyncRef UE 1		ppm	0	
Frequency offset of SyncRef UE 2		ppm	5	
V2X sidelink Communication preconfiguration			As specified in Table A.3.21.2-2	IE values unless specified otherwise in this test.
syncPriority			*gnb*	
syncTxThreshOoC			13 (+infinity)	
T1		s	24	
T2		s	16	
T3		s	16	

Table A.9.1.3.2.1-3: SyncRef UE Specific Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for FR1 NR Cell configured as the highest priority

Parameter	Unit	SyncRef UE 1			SyncRef UE 2		
		T1	T2	T3	T1	T2	T3
NR RF Channel Number		1(TDD carrier in Band n47 or n38)					
SCS	kHz	30					
Channel Bandwidth ($BW_{channel}$) Note 4	MHz	20($N_{RB,c}$ = 50) or 40($N_{RB,c}$ = 100)					
V2X Sidelink Communication resource pool configuration		As specified in Table A.3.21.2-2			As specified in Table A.3.21.2-2		
networkControlledSyncTx		N/A			ON		
syncTxThreshOoC	dBm/15 kHz	+infinity			N/A		
slssid		336+59			30		
inCoverage (in MIB-SL)		FALSE			TRUE		
N_{oc} Note1	dBm/30 kHz	-95					
$\hat{E}_s/N_{oc}$	dB	-infinity	0	0	-infinity	-infinity	3
$\hat{E}_s/I_{ot}$	dB	-infinity	0	-4.76	-infinity	-infinity	0
PSBCH-RSRP Note2, Note 3	dBm/30 kHz	-infinity	-95	-95	-infinity	-infinity	-92
Propagation Condition		AWGN					
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: PSBCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: PSSSS Es/Iot is set the same as PSPSS/PSBCH Es/Iot. Note 4: The UE is only required to be tested in one of the supported test configurations.							

A.9.1.3.2.2 Test Requirements

1) During T2, SyncRef UE selection delay is defined as the time from the beginning of T2 to the time UE is synchronized to SyncRef UE 1 and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 1 as the synchronization source. For the test configuration, the SLSS ID will be changed to 336+59 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T2.

The SyncRef UE selection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 12.4)
- $T_{evaluate,SLSS}$ = 0.64sec (as specified in sub-clause 12.3)
- SLSS period = 160ms

This gives a total of 8.8 seconds.

2) During T3, SyncRef UE reselection delay is defined as the time from the beginning of T3 to the time UE changes its synchronization source from SyncRef UE 1 to SyncRef UE 2, and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 2 as the synchronization source. For the test configuration, the SLSS ID will be changed to 30 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T3.

The SyncRef UE reselection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 12.4)
- $T_{evaluate,SLSS}$ = 0.64 sec (as specified in sub-clause 12.3)
- SLSS period = 160ms

This gives a total of 8.8 seconds.

The test system will verify that the V2X UE does not drop or delay more than 6% of its V2X data and SLSS transmissions during the duration of T2 and T3.

The rate of correct SyncRef UE selection / reselection observed during repeated tests shall be at least 90%.

A.9.1.4 Test for L1 SL-RSRP Measurement

A.9.1.4.1 Test for V2X UE Autonomous Resource Selection/Reselection

A.9.1.4.1.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to autonomous resource selection / reselection for V2X UE in mode 2 defined in clause 12.5. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.9.1.4.1.1-1and A. 9.1.4.1.1-2 below. There are 50 active V2X sidelink UEs (UE0~UE49) in this test. Both the UE under test and active V2X sidelink UEs select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs. The test parameters for GNSS signals are defined in B.4.1. The test system shall emulate the active V2X sidelink UEs to transmit PSCCH/PSSCH every 5ms. At the beginning of whole test, the test equipment shall send one message with a SL-SCH MAC PDU as specified in Clause 6.1.6 in TS 38.321[7], in order to make sure that the UE under test needs continuously transmit PSCCH/PSSCH.

The test consists of two duration T1 and T2. During T1, the signal from Test Equipement are configured such that

- the measured PSSCH-RSRP for 10 active V2X sidelink UEs(UE20~UE29) is above the measurement threshold, and the resource occupied by the 10 active V2X sidelink UEs is expected to be excluded in the resource selection procedure and,
- the measured PSSCH-RSRP for other 40 active V2X sidelink UEs(UE0~UE19, UE30~UE49) is low the measurement threshold, and the resource occupied by the 40 active V2X sidelink UEs is expected to be included in the resource selection procedure.

During T2, the signal from Test Equipement are configured such that

- the measured PSSCH-RSRP for the 10 active V2X sidelink UEs(UE20~UE29) is below the measurement threshold, and the resource occupied by the 10 active V2X sidelink UEs is expected to be included in the resource selection procedure and,
- the measured PSSCH-RSRP for other 40 active V2X sidelink UEs(UE0~UE19, UE30~UE49) is above the measurement threshold, and the resource occupied by the 40 active V2X sidelink UEs is expected to be excluded in the resource selection procedure.

Table A. 9.1.4.1.1-1: Test Parameters for V2X UE Autonomous Resource Selection/Reselection Tests for PSSCH-RSRP measurements

Parameter		Unit	Value	Comment
NR RF Channel Number			1	TDD carrier in Band n47 or n38
Channel Bandwidth ($BW_{channel}$) Note 2		MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS		kHz	30	
V2X sidelink communication pre-configuration			As specified in Table A.3.21.2-1 and A.3.21.2-3	IE values unless specified otherwise in this test.
sl-TimeResource-r16 included in SL-ResourcePool			1111111111	Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3])
sl-NumSubchannel-r16 included in SL-ResourcePool			5	Indicates the number of sub-channels for TX resource pool
sl-SubchannelSize-r16 included in SL-ResourcePool			10	Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB
Number of Active Sidelink UEs			50	Active Sidelink UE i = 0, .., 49
SL-ThresPSSCH-RSRP			12	Corresponding -106 dBm as defined in Section 6.3.5 in TS38.331[2]
Active Sidelink UEs (UE i = 0, .., 49)	V2X sidelink Communication preconfiguration		As specified in Table A.3.21.2-1 And A.3.21.2-3	IE values unless specified otherwise in this test.
	sl-TimeResource-r16 included in SL-ResourcePool		$\{1_i\}$ Note1	Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3])
	sl-NumSubchannel-r16 included in SL-ResourcePool		1	Indicates the number of sub-channels for TX resource pool
	sl-StartRB-Subchannel-r16 included in SL-ResourcePool		floor(i/10)x10	Indicates the lowest RB index of the subchannel with the lowest index. UE 0~9 start RB=0; UE 10~19 start RB=10; UE 20~29 start RB=20; UE 30~39 start RB=30; UE 40~49 start RB=40;
	sl-SubchannelSize-r16 included in SL-ResourcePool		10	Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB
Timing offset among Active Sidelink UEs		μs	CP/2	Synchronous
Note 1: $\{1_i\}$ is a sequence of nine 0's with one 1 in (mod(i,10)+1'th position. Note 2: The UE is only required to be tested in one of the supported test configurations.				

Table A. 9.1.4.1.1-2: Active Sidelink UE Specific Test Parameters for V2X UE Autonomous Resource Selection/Reselection Tests for PSSCH-RSRP measurements

Parameter	Unit	Active Sidelink UE i (i = 0, .., 49)	
		T1	T2
NR RF Channel Number	-	1	
Channel Bandwidth ($BW_{channel}$)[Note 5]	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS	kHz	30	
PSCCH RMC (defined in A.3.21.3)	-	CC.1A HD	
PSSCH RMC (defined in A.3.21.3)	-	CD.1A HD	
N_{oc} Note1	dBm/30 kHz	-111	-121
$\hat{E}_s/N_{oc}$ Note3	dB	10	
$\hat{E}_s/I_{ot}$ Note2,3	dB	10	
$\hat{E}_s/N_{oc}$ Note4	dB	0	20
$\hat{E}_s/I_{ot}$ Note2,4	dB	0	20
PSSCH-RSRP1 Note 2,3	dBm/30kHz	-101	-111
PSSCH -RSRP2 Note 2,4	dBm/30kHz	-111	-101
SL-RSSI1 Note 2,3	dBm/3.6 MHz	-79.79	-89.79
SL-RSSI2 Note 2,4	dBm/3.6 MHz	-87.20	-80.17
Antenna Configuration	-	1x2	
Propagation Condition	-	AWGN	

Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2: Es/Iot, PSSCH-RSRP and SL-RSSI levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: For UE 20 to 29, occupying subchannel #2
Note 4: For UE 0 to 19 and 30 to 49, occupying subchannel #0/1/3/4
Note 5: The UE is only required to be tested in one of the supported test configurations.

A.9.1.4.1.2 Test Requirements

The test time T1 and T2 should be long enough. The rate of PSSCH transmissions on the resources on subchannel #2 shall be less than 10% during T1. The rate of PSSCH transmissions on the resources on subchannel #2 shall be more than 90% during T2.

A. 9.1.4.2 Test for V2X UE Resource Pre-emption

A. 9.1.4.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to autonomous resource pre-emption for V2X UE in mode 2 defined in clause 12.5. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A. 9.1.4.2.1-1and A.12. 9.1.4.1-2 below. There is one active V2X sidelink UE in this test. Both the UE under test and the active V2X sidelink UE select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs. The test parameters for GNSS signals are defined in B.4.1. At the beginning of whole test, the test equipment shall send one message with a SL-SCH MAC PDU as specified in Clause 6.1.6 in TS 38.321[7], in order to make sure that the UE under test needs continuously transmit PSCCH/PSSCH.

The test consists of two duration T1 and T2. During T1, the signal from Test Equipement are configured such that the active V2X sidelink UE is not transmitting. The UE under test shall transmit SL data and reserve future resources. The resource reservation is decoded by the active V2X sidelink UE. The point in time at which resource reservation from the UE under test is decoded by the active V2X sidelink UE defines the start of time period T2. During T2, the active V2X sidelink UE reserves the same resource as the UE under test with high priority data no later than slot n- $T_{pre\text{-}empt}$.

Table A. 9.1.4.2.1-1: Test Parameters for V2X UE Resource Pre-emption Tests for PSSCH-RSRP measurements

Parameter		Unit	Value	Comment
NR RF Channel Number			1	TDD carrier in Band n47 and n38
Channel Bandwidth ($BW_{channel}$) Note 1		MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
V2X sidelink communication pre-configuration			As specified in Table A.3.21.2-1 and A.3.21.2-3	IE values unless specified otherwise in this test.
sl-TimeResource-r16 included in SL-ResourcePool in SL-ResourcePool in sl-TxPoolSelectedNormal-r16			10000000000000000000	Indicates the time resource of resource pool within *sl-Period*. (see TS 38.213 [3]) Note that this is for Tx pool.
sl-TimeResource-r16 included in SL-ResourcePool in sl-RxPool-r16			1111111111111111111	Indicates the time resource of resource pool within *sl-Period*. (see TS 38.213 [3]) Note that this is for Rx pool.
sl-NumSubchannel-r16 included in SL-ResourcePool			1	Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only
sl-SubchannelSize-r16 included in SL-ResourcePool			10	Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB
sl-StartRB-Subchannel-r16 included in SL-ResourcePool			10	Indicates the lowest RB index of the subchannel with the lowest index.
Number of Active Sidelink UEs			1	
SL-ThresPSSCH-RSRP			12	Corresponding -106 dBm as defined in Section 6.3.8 in TS38.331[2]
Active Sidelink UEs	V2X sidelink Communication preconfiguration		As specified in Table A.3.21.2-1 and A.3.21.2-3	IE values unless specified otherwise in this test.
	sl-TimeResource-r16 included in SL-ResourcePool		1111111111111111111	Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3])
	sl-NumSubchannel-r16 included in SL-ResourcePool		1	Indicates the number of sub-channels for TX resource pool
	sl-StartRB-Subchannel-r16 included in SL-ResourcePool		10	Indicates the lowest RB index of the subchannel with the lowest index.
	Sl-SubchannelSize-r16 included in SL-ResourcePool		10	Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB
Timing offset among Active Sidelink Ues		μs	CP/2	Synchronous
Note 1: The UE is only required to be tested in one of the supported test configurations.				

Table A.9.1.4.2.1-2: Active Sidelink UE Specific Test Parameters for V2X UE Resource Pre-emption Tests for PSSCH-RSRP measurements

Parameter	Unit	Active Sidelink UE	
		T1	T2
NR RF Channel Number	-	1	
Channel Bandwidth ($BW_{channel}$) Note 3	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS	kHz	30	
PSCCH RMC (defined in A.3.21.3)	-	CC.1A HD	
PSSCH RMC (defined in A.3.21.3)	-	CD.1A HD	
N_{oc} Note1	dBm/30 kHz	N/A	-100
PSCCH $\hat{E}_s/N_{oc}$	dB		5
PSSCH $\hat{E}_s/N_{oc}$	dB		5
PSCCH $\hat{E}_s/I_{ot}$ Note2	dB		5
PSSCH $\hat{E}_s/I_{ot}$ Note2	dB		5
PSSCH-RSRP Note 2	dBm/30kHz		-95
Antenna Configuration	-	1x2	
Propagation Condition	-	AWGN	
Note 1: Interference from other Ues and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: Es/Iot, PSSCH-RSRP have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: The UE is only required to be tested in one of the supported test configurations.			

A.9.1.4.2.2 Test Requirements

The test time T1 and T2 should be long enough. The UE under test is required to trigger resource reselection and not to transmit on the reserved resource at slot n when the high priority reservation is transmitted by the active V2X sidelink UE before n-$T_{pre\text{-}empt}$, where

$T_{pre\text{-}empt} = T_3 + T_{proc,0}$

T_3 = 2ms and $T_{proc,0}$= 1 slot for FR1.

The rate of PSSCH transmissions on the resources at slot n shall be less than 10% during repeated tests.

A.9.1.4.3 Test for V2X UE Resource Re-evaluation

A.9.1.4.3.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to autonomous resource re-evaluation for V2X UE in mode 2 defined in clause 12.5. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.9.1.4.3.1-1, A.9.1.4.3.1-2 and A.9.1.4.3.1-3 below. There are 130 active V2X sidelink Ues in this test. The first 100 active V2X sidelink Ues are scheduled with 50ms periodicity. The last 30 active V2X sidelink Ues are aperiodic service UE with retransmission reservation period equaling 15ms.

Both the UE under test and active V2X sidelink Ues select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink Ues. The test parameters for GNSS signals are defined in B.4.1.

The test consists of three duration T0, T1, T2.

During T0, the signal from Test Equipement are configured. The resource occupied by the active V2X sidelink UEs is expected to be excluded in the resource selection procedure such that the measured PSSCH-RSRP is above the measurement threshold. The test equipment shall just configure the resource pool for the test UE without the MAC PDU for transmission channel configuration.

During T1, the signal from Test Equipement are configured. Some of the resource occupied by the active V2X sidelink Ues is expected to be excluded in the resource selection procedure such that the measured PSSCH-RSRP is above the measurement threshold and some of the resource occupied by the active V2X sidelink Ues is expected to be included in the resource selection procedure such that the measured PSSCH-RSRP is below the measurement threshold. The test system shall emulate the active V2X sidelink Ues to transmit PSCCH/PSSCH every 50ms according to the RSRP level specified in the Table A. 9.1.4.3.1-2, but UE #0~29 will be silent during T2.

At the end of T1, where slot index mod 100 = 99, the test equipment shall send one message with a SL-SCH MAC PDU as specified in Clause 6.1.6 in TS 38.321[7], in order to make sure that the UE under test shall be scheduled to periodically transmit PSCCH/PSSCH.

During T2, the additional aperiodic active V2X sidelink UEs from Test Equipement are configured in the beginning 30 slots, and the resource occupied by these active V2X sidelink UEs is expected to be excluded in the resource re-evaluation procedure such that the measured PSSCH-RSRP is above the measurement threshold shown in Table A. 9.1.4.3.1-2. The test system shall emulate the active V2X sidelink UEs to transmit PSCCH/PSSCH with the maximum number of reserved PSCCH/PSSCH resources equalling n2 and time resource assignment interval as 15ms.

During T2, the test UE is expeted to reselect the resources and transmit the PSCCH/PSSCH in the newly re-evaluated resources.

Table A.9.1.4.3.1-1: Test Parameters for V2X UE Resource Selection Tests for Re-evaluation

Parameter		Unit	Value	Comment
NR RF Channel Number			1	TDD carrier in Band n47 and n38
Channel Bandwidth ($BW_{channel}$) Note 2		MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS		kHz	30	
V2X sidelink communication pre-configuration			As specified in Table A.3.21.2-2	IE values unless specified otherwise in this test.
sl-TimeResource-r16 included in SL-ResourcePool			11111111111111111111 11111111111111111111 11111111111111111111 11111111111111111111 11111111111111111111	Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3])
sl-NumSubchannel-r16 included in SL-ResourcePool			1	Indicates the number of sub-channels for TX resource pool
sl-SubchannelSize-r16 included in SL-ResourcePool			10	
sl-StartRB-Subchannel-r16			0	
Number of Active Sidelink UEs			130	Active Sidelink UE i = 0, .., 129
SL-ThresPSSCH-RSRP-r16			17	Corresponding -96 dBm as defined in Section 6.3.5 in TS38.331[2]
Active Sidelink UEs(UE i=0-99)	V2X sidelink Communication preconfiguration		As specified in Table A.3.21.2-2	IE values unless specified otherwise in this test.
	sl-TimeResource-r16 included in SL-ResourcePool		$\{1_i\}^{Note1}$	Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213 [3])
	sl-NumSubchannel-r16 included in SL-ResourcePool		1	Indicates the number of sub-channels for TX resource pool
	sl-SubchannelSize-r16 included in SL-ResourcePool		10	Indicates the size of sub-channels for TX resource pool
	sl-ResourceReservePeriod2-r16	ms	50	
Active Sidelink UEs(UE i= 100-129)	V2X sidelink Communication preconfiguration		As specified in Table A.3.21.2-2	IE values unless specified otherwise in this test.
	sl-TimeResource-r16 included in SL-ResourcePool		$\{1_i\}^{Note1}$	Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213 [3])
	sl-NumSubchannel-r16 included in SL-ResourcePool		1	Indicates the number of sub-channels for TX resource pool
	sl-SubchannelSize included in SL-ResourcePool		10	Indicates the size of sub-channels for TX resource pool
	sl-MultiReserveResource-r16		enabled	
	sl-MaxNumPerReserve-r16		n2	
	sl-ResourceReservePeriod2-r16		0	Unit:ms
Timing offset among Active Sidelink UEs		μs	CP/2	Synchronous

T0	s	1	
T1	ms	50	
T2	ms	50	
Note 1: $\{1_i\}$ is a sequence of ninety-nine 0's with one 1 in (mod(i,100)+1)'th position. Note 2: The UE is only required to be tested in one of the supported test configurations.			

Table A.9.1.4.3.1-2: Active Sidelink UE Specific Test Parameters for V2X UE Resource Selection Tests for Re-evaluation (UE #0...99)

Parameter	Unit	Active Sidelink UE i (i = 0, .., 99)	
		T1	T2
NR RF Channel Number	-	1	
Channel Bandwidth ($BW_{channel}$) Note 7	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS	kHz	30	
PSCCH RMC (defined in A.3.21.3)	-	CC.1A HD	
PSSCH RMC (defined in A.3.21.3)	-	CD.1A HD	
N_{oc} Note1	dBm/SCS	-103	
PSSCH1 $\hat{E}_s/N_{oc}$ Note 3	dB	22	22
PSSCH2 $\hat{E}_s/N_{oc}$ Note 4	dB	2	2
PSSCH3 $\hat{E}_s/N_{oc}$ Note 5	dB	12	-infinity
PSSCH4 $\hat{E}_s/N_{oc}$ Note 6	dB	12	12
PSSCH1 $\hat{E}_s/I_{ot}$ Note2,3	dB	22	22
PSSCH2 $\hat{E}_s/I_{ot}$ Note2,4	dB	2	2
PSSCH3 $\hat{E}_s/I_{ot}$ Note2,5	dB	12	-infinity
PSSCH4 $\hat{E}_s/I_{ot}$ Note2,6	dB	12	12
PSSCH -RSRP1 Note 2, 3	dBm/SCS	-81	-81
PSSCH -RSRP2 Note 2, 4	dBm/SCS	-101	-101
PSSCH -RSRP3 Note 2, 5	dBm/SCS	-91	-infinity
PSSCH -RSRP4 Note 2, 6	dBm/SCS	-91	-91
Antenna Configuration	-	1x2	
Propagation Condition	-	AWGN	
Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: $\hat{E}_s/I_{ot}$, PSSCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: UE #50~64 and UE #85~99 will periodically occupy the subchannels on the slot with "#slot index mod 100" = #50-64 and #85-99. Note 4: UE #30~49 will periodically occupy the subchannels on the slot with "#slot index mod 100" = #30-49. Note 5: UE #0~29 will periodically occupy the subchannels on the slot with "#slot index mod 100" = #0-29. Note 6: UE #65~84 will periodically occupy the subchannels on the slot with "#slot index mod 100" = #65-84. Note 7: The UE is only required to be tested in one of the supported configurations.			

Table A.9.1.4.3.1-3: Active Sidelink UE Specific Test Parameters for V2X UE Resource Selection Tests for Re-evaluation (UE #100…129)

Parameter	Unit	Active Sidelink UE i (i = 100, .., 129)	
		T1	T2
NR RF Channel Number	-	1	
Channel Bandwidth ($BW_{channel}$) Note 4	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS	kHz	30	
PSCCH RMC (defined in A.3.21.3)	-	CC.1A HD	
PSSCH RMC (defined in A.3.21.3)	-	CD.1 A HD	
N_{oc} Note1	dBm/SCS	-103	
PSSCH $\hat{E}_s/N_{oc}$	dB	-infinity	22
PSSCH $\hat{E}_s/I_{ot}$ Note2	dB	-infinity	22
PSSCH-RSRP Note 2, Note 3	dBm/SCS	-infinity	-81
Antenna Configuration	-	1x2	
Propagation Condition	-	AWGN	

Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: Es/Iot, PSSCH-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: UE #100~129 will occupy the subchannels on the slots with "#slot index mod 100"= #0-29 during T2.

Note 4: The UE is only required to be tested in one of the supported configurations.

A.9.1.4.3.2 Test Requirements

The rate of PSSCH transmissions on the resources of the subchannels which are occupied by UE #65-84 shall be more than 90% during T2.

A.9.1.5 Test for Congestion Control Measurement

A.9.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the V2X UE makes correct reporting of an event. This test will verify the congestion control measurement requirements in section 12.6.

The test parameters are given in Table A.9.1.5.1-1, Table A.9.1.5.1-2 and A.9.1.5.1-3 below. In the measurement control information it is indicated to the V2X UE that event-triggered reporting with Event C1 is used. There are 4 active V2X sidelink UEs in this test. The test system shall emulate the active sidelink UE to transmit PSCCH/PSSCH every 50ms. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During T1, all of active V2X sidelink UEs are configured to transmit PSCCH/PSSCH with lower transmission power every 50ms. During T2, all of active V2X sidelink UEs are configured to transmit PSCCH/PSSCH with higher transmission power every 50ms.

Supported test configurations for FR1 NR cell are shown in Table A.9.1.5.1.1-1.

Table A.9.1.5.1.1-1: Supported Test Configurations for FR1 NR cell

Configuration	Description
1	NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.9.1.5.1-2: General test parameters for Congestion Control Measurement Test for V2X UE

Parameter		Unit	Value	Comment
NR RF Channel Number			1	TDD carrier in Band n47 or n38
Channel Bandwidth ($BW_{channel}$)Note 2		MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS		kHz	30	
V2X sidelink communication configuration			As specified in Table A.3.21.2-1 and A.3.21.2-3	IE values unless specified otherwise in this test.
sl-TimeResource-r16 included in SL-ResourcePool			1111111111111111111 1111111111111111111 1111111111111111111 1111111111111111111 1111111111111111111	Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3])
sl-NumSubchannel-r16 included in SL-ResourcePool			1	ENUMERATED {n1}
sl-SubchannelSize included in SL-ResourcePool			10	ENUMERATED {n10}
sl-StartRB-Subchannel-r16			0	
threshS-RSSI-CBR			19	Corresponding -74dBm as defined in Section 6.3.8 in TS38.331[2]
Number of Active Sidelink UEs every 50ms			4	Active Sidelink UE i, where i = 0, 1, 2, 3
Active Sidelink UEs (i = 0,1,2,3)	V2X sidelink Communication configuration		As specified in Table A.3.21.2-1 and A.3.21.2-3	IE values unless specified otherwise in this test.
	sl-TimeResource-r16 included in SL-ResourcePool		$\{1_i\}^{Note1}$	Indicates the bitmap of the TX and Rx resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 38.213[3])
	sl-NumSubchannel-r16 included in SL-ResourcePool		1	
	sl-SubchannelSize included in SL-ResourcePool		10	
Timing offset between V2X UE and Active Sidelink UEs		μs	CP/2	Synchronous
c1-Threshold-r16			2	Corresponding 0.02 as defined in Section 6.3.2 in TS38.331[2]
sl-CBR-RangeConfigList-r16			[2 100]	Two ranges are defined by this list: 0 to 0.02 and 0.02 to 1
sl-CR-Limit-r16			10 and 100	Corresponding to the two CBR ranges: if CBR > 0.02, CR < 0.001, otherwise CR > 0.0001
sl-ThresPSSCH-RSRP-r16			12	Configure threshold <-98.64dBm/30kHz to ensure not blocking transmission

Hysteresis		0	
Time To Trigger	s	0	
Filter coefficient		0	L3 filtering is not used
T1	s	5	
T2	s	5	
Note 1: {1ᵢ} is a sequence of ninety nine 0's with one 1 in i+1'th position. Note 2: The UE is only required to be tested in one of the channel bandwidths.			

Table A.9.1.5.1-3: Active sidelink UE specific test parameters for Congestion Control Measurement Test for V2X UE

Parameter	Unit	Active Sidelink UE *i* (*i* = 0, 1, 2, 3)	
		T1	T2
NR RF Channel Number		1	
Channel Bandwidth ($BW_{channel}$) Note 7	MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS	kHz	30	
PSCCH RMC (defined in A.3.21.3)		CC.1A HD	
PSSCH RMC (defined in A.3.21.3)		CD.1A HD	
N_{oc} Note1	dBm/30 kHz	-103	
$\hat{E}_s/N_{oc}$	dB	4.35	10.32
PSSCH-RSRP Note 2	dBm/30 kHz	-98.65	-92.68
SL-RSSI1 Note 2,3	dBm/3.6 MHz	-76.5	-71.5
SL-RSSI2 Note 2,4	dBm/3.6 MHz	-82.21	-82.21
Io1 Note 2,5	dBm/3.6 MHz	-76.5	-71.5
Io2 Note 2,6	dBm/3.6 MHz	-82.21	-82.21
Propagation Condition	-	AWGN	
Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: PSSCH E_s/N_{oc}, PSSCH-RSRP, SL-RSSI1, SL-RSSI2, Io1 and Io2 levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SL-RSSI1 is the SL-RSSI level measured on the slot# 0 - 3 with "SFN mod 5 = 0". Note 4: SL-RSSI2 is the SL-RSSI level measured on the slot# 4-9 with "SFN mod 5 = 0" and the slot# 0-9 with "SFN mod 5 = 1,…, 4". Note 5: Io1 is the Io level measured on the slot# 0 - 3 with "SFN mod 5 = 0". Note 6: Io2 is the Io level measured on the slot# 4-9 with "SFN mod 5 = 0" and the slot# 0-9 with "SFN mod 5 = 1,…, 4". Note 7: The UE is only required to be tested in one of the supported test configurations.			

A.9.1.5.2 Test Requirements

For UEs that support NR Uu and sidelink operation, the UEs shall not send event C1 triggered measurement reports during T1 and shall send event C1 triggered measurement reports during T2.

For UEs that support sidelink operation only, the UE channel occupancy ratio shall be larger than 0.001 during T1, and the UE channel occupancy ratio shall be smaller than 0.001 curing T2.

The rate of correct events observed during repeated tests shall be at least 98%.

A.9.1.6 Test for Interruption

A.9.1.6.1 Test for Interruption to WAN due to V2X Sidelink Communication

A.9.1.6.1.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to V2X sidelink communication defined in clause 12.7.1 under the following additional conditions:

- The UE is out of coverage on the V2X sidelink carrier and is associated with a serving cell on a non-V2X sidelink carrier

This test is applicable for V2X sidelink communication capable UEs that support inter-band concurrent V2X sidelink operation.

For this test, the UE is triggered by the test loop function or the upper layers to monitor V2X sidelink communication.

The test parameters are given in Table A.9.1.6.1.1-1, Table A.9.1.6.1.1-2, Table A.9.1.6.1.1-3 and Table A.9.1.6.1.1-4. The test consists of one active cell (PCell) on the serving RF channel 1, and there are no active cells on RF channel 2. On RF channel 2, the test consists of 8 active Sidelink UEs in this test transmitting V2X sidelink communication.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the UE is in RRC_IDLE and monitoring the V2X sidelink communication transmission from other active Sidelink UEs on the V2X sidelink communication resources.

During T2, the test system establishes a RRC connection with the UE. No PDSCH traffic is scheduled for UE, and the UE is expected to transmit *SidelinkUEInformationNR* indicating *sl-RxInterestedFreqList*. On reception of *SidelinkUEInformationNR*, the test system shall send RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before transitioning to T3. If the UE does not transmit *SidelinkUEInformationNR* for up to 2 second, the test system shall transition to T3.

During T3, the UE is scheduled with PDSCH traffic on PCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during V2X sidelink communication (no missed ACK/NACKs are allowed).

Table A.9.1.6.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	NR Uu: FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR Uu: TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR Uu: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.9.1.6.1.1-2: Test Parameters for Interruptions due to V2X Sidelink Communication

Parameter	Unit	Value	Comment
RF Channel Number	-	1, 2	RF channel 1 is non-V2X sidelink carrier RF channel 2 is V2X sidelink carrier
Active cell	-	Cell 1	PCell on RF channel number 1
CP length of Cell 1	-	Normal	
T1	s	5.12	
T2	s	Up to receiving RRC reconfiguration setup complete from the UE, or up to 2 second if UE does not transmit *SidelinkUEInformationNR* during this period.	
T3	s	10	

Table A.9.1.6.1.1-3: Slidelink Communication Configuration for Interruptions due to V2X Sidelink Communication

Parameter		Unit	Value	Comment
RF Channel Number		-	2	TDD carrier in Band n47 or n38
Channel Bandwidth ($BW_{channel}$) Note 1		MHz	20 ($N_{RB,c}$ = 50) or 40 ($N_{RB,c}$ = 100)	
SCS		kHz	30	
V2X sidelink Communication configuration		-	As specified in section A.3.21.2	IE values unless specified otherwise in this test.
Number of Active Sidelink UEs		-	8	Active Sidelink UE i = 0, .., 7
Active Sidelink UEs (UE i = 0, .., 7)	V2X sidelink Communication configuration	-	As specified in section A.3.21.2	IE values unless specified otherwise in this test.
	PSCCH Reference Measurement Channel	-	CC.1A HD	As specified in Table A.3.21.3-1
	PSSCH Reference Measurement Channel	-	CD.1A HD	As specified in Table A.3.21.3-2
	sl-NumSubchannel-r16 included in SL-ResourcePool	-	1	Indicates the number of sub-channels for TX resource pool
	sl-StartRB-Subchannel-r16 included in SL-ResourcePool	-	i	Indicates the lowest RB index of the subchannel with the lowest index for active Sidelink UE i = 0, .., 7.
	PSBCH-RSRP	dBm/30kHz	-95	
Note 1: The UE is only required to be tested in one of the supported test configurations.				

Table A.9.1.6.1.1-4: Cell specific test parameters for interruptions due to V2X slidelink communication

Parameter		Unit	Cell 1		
			T1	T2	T3
RF Channel Number			1		
UE RRC state			IDLE	CONNECTED	
Duplex Mode	Config 1		FDD		
	Config 2,3		TDD		
TDD configuration	Config 1		Not Applicable		
	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
Channel Bandwidth ($BW_{channel}$)	Config 1,2	MHz	10: $N_{RB,c}$ = 52		
	Config 3		40: $N_{RB,c}$ = 106		
Initial BWP Configuration			DLBWP.0.1 ULBWP.0.1		
Dedicated BWP Configuration			DLBWP.1.1 ULBWP.1.1		
DRX Cycle			N/A		
PDSCH Reference measurement channel	Config 1		N/A	None	SR.1.1 FDD
	Config 2		N/A	None	SR.1.1 TDD
	Config 3		N/A	None	SR.2.1 TDD
CORESET Reference Channel	Config 1		CR.1.1 FDD		
	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD		
	Config 2		CCR.1.1 TDD		
	Config 3		CCR.2.1 TDD		
SSB configuration	Config 1,2		SSB.1 FR1		
	Config 3		SSB.2 FR1		
SMTC Configuration			SMTC.2		
OCNG Patterns			OP.1		
EPRE ratio of PSS to SSS		dB	0		
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2	Config 1,2,3	dBm/15 kHz	-98		
N_{oc} Note2	Config 1,2	dBm/SCS	-98		
	Config 3		-95		
$\hat{E}_s/N_{oc}$		dB	3		
SS-RSRP Note3	Config 1,2	dBm/SCS	-95		
	Config 3		-92		
Io Note 3	Config 1,2	dBm/9.36 MHz	-65.3		
	Config 3	dBm/38.1 MHz	-59.2		
Antenna Configuration			1x2		
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.9.1.6.1.2 Test Requirements

The UE shall be continuously scheduled on PCell on RF channel 1 during T3. During T3, 100% of all expected ACK/NACKs shall be transmitted by the V2X UE.

A.10 EN-DC Tests with NR PSCell under CCA and Other NR Cells in FR1

Editor's note: Test cases for EN-DC with NR PSCell under CCA and SCell under CCA are also included here.

A.10.1 RRC_CONNECTED state mobility

A.10.1.1 RRC connection mobility control

A.10.1.1.1 Random Access

A.10.1.1.1.1 4-step RA type contention-based random access for NR PSCell with CCA

A.10.1.1.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7A.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.1.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.1.1-2.

Table A.10.1.1.1.1.1-1: Supported test configurations for contention based random access test in FR1 for PSCell with CCA

Config	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.10.1.1.1.1.1-2: General test parameters for contention based random access test in FR1 for PSCell with CCA

<table>
<tr><th colspan="3">Parameter</th><th>Unit</th><th>Test-1</th><th>Comments</th></tr>
<tr><td rowspan="2">SSB Configuration</td><td>Note 4, 6</td><td>Config 1,2</td><td></td><td>SSB.1 CCA</td><td>As defined in A.3.10A</td></tr>
<tr><td>Note 5, 6</td><td>Config 1,2</td><td></td><td>SSB.2 CCA</td><td>As defined in A.3.10A</td></tr>
<tr><td colspan="2">DBT Window Configuration</td><td>Config 1,2</td><td></td><td>DBT.1</td><td>As specified in A.3.28.1</td></tr>
<tr><td colspan="2">DL CCA model</td><td>Config 1,2</td><td></td><td>As specified in A.3.26.2.1</td><td></td></tr>
<tr><td colspan="2">UL CCA model</td><td>Config 1,2</td><td></td><td>As specified in A.3.26.2.2</td><td></td></tr>
<tr><td colspan="2">Duplex Mode for Cell 2</td><td>Config 1,2</td><td></td><td>TDD</td><td></td></tr>
<tr><td colspan="2">TDD Configuration</td><td>Config 1,2</td><td></td><td>TDDConf.1.1 CCA</td><td></td></tr>
<tr><td colspan="3">OCNG Pattern Note 1</td><td></td><td>OCNG pattern 1</td><td>As defined in A.3.2.1.</td></tr>
<tr><td colspan="2">PDSCH parameters Note 3</td><td>Config 1,2</td><td></td><td>SR.1.1 CCA</td><td>As defined in A.3.1A.1.</td></tr>
<tr><td colspan="3">NR RF Channel Number</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PSS to SSS</td><td>dB</td><td rowspan="7">0</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PBCH_DMRS to SSS</td><td>dB</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PBCH to PBCH_DMRS</td><td>dB</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PDCCH_DMRS to SSS</td><td>dB</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PDCCH to PDCCH_DMRS</td><td>dB</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PDSCH_DMRS to SSS</td><td>dB</td><td></td></tr>
<tr><td colspan="3">EPRE ratio of PDSCH to PDSCH_DMRS</td><td>dB</td><td></td></tr>
<tr><td rowspan="4">SSB with index 0</td><td colspan="2">$\hat{E}_s/I_{ot}$</td><td>dB</td><td>3</td><td rowspan="4">Power of SSB with index 0 is set to be above configured rsrp-ThresholdSSB</td></tr>
<tr><td>N_{oc}</td><td>Config 1,2</td><td>dBm/15kHz</td><td>-101</td></tr>
<tr><td colspan="2">$\hat{E}_s/N_{oc}$</td><td>dB</td><td>3</td></tr>
<tr><td colspan="2">SS-RSRP</td><td>dBm/ SCS</td><td>-95</td></tr>
<tr><td rowspan="4">SSB with index 1</td><td colspan="2">$\hat{E}_s/I_{ot}$</td><td>dB</td><td>-17</td><td rowspan="4">Power of SSB with index 1 is set to be below configured rsrp-ThresholdSSB</td></tr>
<tr><td>N_{oc}</td><td>Config 1,2</td><td>dBm/15kHz</td><td>-101</td></tr>
<tr><td colspan="2">$\hat{E}_s/N_{oc}$</td><td>dB</td><td>-17</td></tr>
<tr><td colspan="2">SS-RSRP</td><td>dBm/ SCS</td><td>-115</td></tr>
<tr><td colspan="2">Io Note 2</td><td>Config 1,2</td><td>dBm</td><td>-62.2/38.16MHz</td><td>For symbols without SSB index 1</td></tr>
<tr><td colspan="3">ss-PBCH-BlockPower</td><td>dBm/ SCS</td><td>-5</td><td>As defined in clause 6.3.2 in TS 38.331 [2].</td></tr>
<tr><td colspan="3">Configured UE transmitted power ($P_{\mathrm{CMAX,\,f,\,c}}$)</td><td>dBm</td><td>23</td><td>As defined in clause 6.2.4 in TS 38.101-1.</td></tr>
<tr><td colspan="3">PRACH Configuration</td><td></td><td>FR1 PRACH configuration 1 under CCA</td><td>As defined in A.3.8A.2.</td></tr>
<tr><td rowspan="2">DL CCA probability P_{CCA_DL}</td><td colspan="2">Note 4, 6</td><td></td><td>0.9375</td><td></td></tr>
<tr><td colspan="2">Note 5, 6</td><td></td><td>0.75/0.75</td><td></td></tr>
<tr><td colspan="3">L_{CCA_DL} Note 7</td><td></td><td>4</td><td></td></tr>
<tr><td colspan="3">W_{CCA_DL} Note 8</td><td></td><td>Inf</td><td></td></tr>
<tr><td rowspan="2">UL CCA probability P_{CCA_UL}</td><td colspan="2">Note 4, 6</td><td></td><td>0.87</td><td></td></tr>
<tr><td colspan="2">Note 5, 6</td><td></td><td>0.75</td><td></td></tr>
<tr><td colspan="3">L_{CCA_UL} Note 7</td><td></td><td>5</td><td></td></tr>
<tr><td colspan="3">W_{CCA_UL} Note 8</td><td></td><td>Inf</td><td></td></tr>
<tr><td colspan="3">Semi-static channel access config period</td><td>ms</td><td>2</td><td></td></tr>
</table>

Note 4, 6			
Propagation Condition	-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.10.1.1.1.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.10.1.1.1.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2A.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*, if the UL CCA is successful.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.10.1.1.1.1.2:

- The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.
- In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.
- In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 transmission is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2A.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.10.1.1.1.1.2.5 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2A.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.10.1.1.1.2 4-step RA type non-contention based random access for NR PSCell with CCA

A.10.1.1.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7A.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.2.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.2.1-2.

Table A.10.1.1.1.2.1-1: Supported test configurations for non-contention based random access test in FR1 for PSCell with CCA

Config	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.10.1.1.1.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1,2		SSB.1 CCA	As defined in A.3.10A
	Note 5, 6	Config 1,2		SSB.2 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1,2		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1,2		As specified in A.3.26.2.1	
UL CCA model		Config 1,2		As specified in A.3.26.2.2	
Duplex Mode for Cell 2		Config 1,2		TDD	
TDD Configuration		Config 1,2		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1,2		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1,2	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1,2	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2		Config 1,2	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\text{CMAX, f, c}}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration				FR1 PRACH configuration 2 under CCA	As defined in A.3.8A.2.
DL CCA probability P_{CCA_DL}	Note 4, 6			0.9375	
	Note 5, 6			0.75/0.75	
L_{CCA_DL} Note 7				4	

W_{CCA_DL} Note 8			Inf	
UL CCA probability P_{CCA_UL}	Note 4, 6		0.87	
	Note 5, 6		0.75	
L_{CCA_UL} Note 7			5	
W_{CCA_UL} Note 8			Inf	
Semi-static channel access config period Note 4, 6		ms	2	
Propagation Condition		-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.10.1.1.1.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.10.1.1.1.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.2.2.1 for SSB-based Random Access Preamble transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.10.1.1.1.2.2:

- The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

- In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

- In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.2.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.2.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.3 2-step RA type contention-based random access for NR PSCell with CCA

A.10.1.1.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behaviour of the random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.3 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7A.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.3.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.3.1-2.

Table A.10.1.1.1.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR1 for PSCell with CCA

Config	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.10.1.1.1.3.1-2: General test parameters for 2-step RA type contention based random access test in FR1 for PSCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1,2		SSB.1 CCA	As defined in A.3.10A
	Note 5, 6	Config 1,2		SSB.2 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1,2		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1,2		As specified in A.3.26.2.1	
UL CCA model		Config 1,2		As specified in A.3.26.2.2	
Duplex Mode for Cell 2		Config 1,2		TDD	
TDD Configuration		Config 3,4		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1,2		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1,2	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP Note 2		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1,2	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP Note 2		dBm/ SCS	-115	
Io		Config 1,2	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\text{CMAX, f, c}}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
MsgA Configuration				FR1 MsgA configuration 1 under CCA	As defined in A.3.20A.2.
msgA-RSRP-ThresholdSSB			dBm	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
DL CCA probability P_{CCA_DL}	Note 4, 6			0.9375	
	Note 5, 6			0.75/0.75	
L_{CCA_DL} Note 7				4	
W_{CCA_DL} Note 8				Inf	
UL CCA probability P_{CCA_UL}	Note 4, 6			0.87	
	Note 5, 6			0.75	

L_{CCA_UL} Note 7		5	
W_{CCA_UL} Note 8		Inf	
Semi-static channel access config period Note 4, 6	ms	2	
Propagation Condition	-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.10.1.1.1.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.10.1.1.1.3.2.1 MsgA Transmission

To test the UE behaviour specified in Clause 6.2.2A.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*, if the UL CCA is successful.

below are relevant for all cases of MsgA transmissions described within the clause A.10.1.1.1.3.2:

- The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

- In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

- The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure. In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.3.2.2 MsgB Reception

To test the UE behaviour specified in Clause 6.2.2A.3.1.2 the System Simulator shall transmit a MsgB with fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB's contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble .

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.1.3 the System Simulator shall transmit a MsgB with fallbackRAR containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.4 2-step RA type non-contention based random access for NR PSCell with CCA

A.10.1.1.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in clause 6.2.2A.3 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Cell 1 is on a licensed band and cell 2 is subjected to CCA. Supported test parameters are shown in Table A.10.1.1.1.4.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.10.1.1.1.4.1-2.

Table A.10.1.1.1.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR1 for PSCell with CCA

Config	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability	

Table A.10.1.1.1.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR1 for PSCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1,2		SSB.1 CCA	As defined in A.3.10A
	Note 5, 6	Config 1,2		SSB.2 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1,2		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1,2		As specified in A.3.26.2.1	
UL CCA model		Config 1,2		As specified in A.3.26.2.2	
Duplex Mode for Cell 2		Config 1,2		TDD	
TDD Configuration		Config 1,2		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1,2		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1,2	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1,2	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2		Config 1,2	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{CMAX,f,c}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
MsgA Configuration				FR1 MsgA configuration 2 under CCA	As defined in A.3.20A.2.
msgA-RSRP-ThresholdSSB			dBm	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].

DL CCA probability P_{CCA_DL}	Note 4, 6		0.9375	
	Note 5, 6		0.75/0.75	
L_{CCA_DL} Note 7			4	
W_{CCA_DL} Note 8			Inf	
UL CCA probability P_{CCA_UL}	Note 4, 6		0.87	
	Note 5, 6		0.75	
L_{CCA_UL} Note 7			5	
W_{CCA_UL} Note 8			Inf	
Semi-static channel access config period Note 4, 6		ms	2	
Propagation Condition		-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.10.1.1.1.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.10.1.1.1.4.2.1 MsgA Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.3.2.1 for MsgA transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

The three requirements below are relevant for all cases of MsgA transmissions described within the clause A.10.1.1.1.4.2:

- The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.
- In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

- The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all MsgA transmission shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2A.3.2.2 the System Simulator shall transmit a MsgB containing a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble after 5 MsgA transmissions have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB if the MsgB contains a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power if Random Access Responses Reception has not been considered as successful.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.1.1.1.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.2.3 the System Simulator shall transmit a MsgB corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window configured in *RACH-ConfigGenericTwoStepRA*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.10.2 Timing

A.10.2.1 UE transmit timing

A.10.2.1.1 UE Transmit Timing Test with PSCell under DL CCA

A.10.2.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb when PSCell is subject to DL CCA and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 10.2.1.1.1-1.

Table A.10.2.1.1.1-1: Supported test configurations for UE transmit timing test

Config	Description
1	LTE FDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to be tested in one of the supported test configurations.	

The test consists of E-UTRA PCell and NR PSCell, which is subject to DL CCA. The configuration for E-UTRA is given in A.3.7.2.1. Table A.10.2.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.10.2.1.1.1-3.

Table A.10.2.1.1.1-2: Cell Specific Test Parameters for UE Transmit Timing test

Parameter		Unit	Config	Test1	Test2
SSB ARFCN			1,2	Freq1	Freq1
TDD configuration			1,2	TDDConf.1.1 CCA	
$BW_{channel}$		MHz	1,2	40: $N_{RB,c}$ = 106	
Initial BWP Configuration			1,2	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration			1,2	DLBWP.1.1 ULBWP.1.1	
DRX Cycle		ms	1,2	N/A	DRX.8[Note5]
DL CCA model			1,2	As specified in clause A.3.26.2.1	
UL CCA model			1,2	As specified in clause A.3.26.2.2	
PDSCH Reference			1,2	SR.1.1 CCA	
CORESET Reference			1,2	CR.1.1 CCA	
OCNG Patterns			1,2	OCNG pattern 1	
SSB configuration	Semi- static channel acces		1,2	SSB.1 CCA	
	Dymamic channel acces		1,2	SSB.2 CCA	
SMTC configuration			1,2	SMTC.1 FR1	
TRS configuration			1,2	TRS.1.2 TDD	
DL CCA probability for semi-static channel access (P_{CCA_DL})			1,2	0.9375	0.9375
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)			1,2	0.75	0.75
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)			1,2	0.75	0.75
UL CCA probability (P_{CCA_UL})			1,2	1	1
EPRE ratio of PSS to SSS		dB	1,2	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} [Note2]		dBm/30 kHz	1,2	-95	-95
$\hat{E}_s/I_{ot}$			1,2	3	3
$\hat{E}_s/N_{oc}$			1,2	3	3
SS-RSRP[Note3]		dBm/30 kHz	1,2	-92	-92
Io[Note3]		dBm/38.1MHz	1,2	-59.2	-59.2
Propagation condition			1,2	AWGN	
SRS Config			1,2	SRSConf.1[Note6]	SRSConf.2[Note6]

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: DRX related parameters are given in Table A.3.3.8-1
Note 6: SRS configs are given in Table A.10.2.1.1.1-3.
Note 7: Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.

Note 8:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.10.2.1.1.1-3: SRS Configuration for UE transmit timing

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-ResourceId	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	14 for test configuration 1,2 25 for test configuration 3	25	Matches $N_{RB,c}$
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 0	Offset to align with DRx periodicity
	sequenceId	0	0	Any 10 bit number

A.10.2.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.10.2.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA\_offset})\times T_c \pm T_e$ of the first detected path of DL SSB.

   a. The N_{TA} offset value (in T_c units) is 25600

   b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.10.2.1.1.2-1

Table A.10.2.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value	
	Test1	Test2
30	+32*64T_c	+16*64T_c

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (N_{TA} + N_{TA_offset}) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within (N_{TA} + N_{TA_offset}) ×T_c ± T_e of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.10.2.2 UE timing advance

A.10.2.2.1 UE Timing Advance Adjustment Accuracy with PSCell under DL CCA

A.10.2.2.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.10.2.2.1.2 Test Parameters

Supported test configurations are shown in table A.10.2.2.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.10.2.2.1.2-2, A.10.2.2.1.2-3 and A.10.2.2.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell which is subject to DL CCA is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.10.2.2.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.10.2.2.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.10.2.2.1.2-1: Supported test configurations for timing advance test

Config	Description
1	LTE FDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: The UE supporting EN-DC only on NR band(s) with shared spectrum access is required to be tested	

Table A.10.2.2.1.2-2: General test parameters for timing advance test

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1 Cell 2: 2	1 for E-UTRAN PCell 2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T_A) value during T1		31	$N_{TA\_new} = N_{TA\_old}$ for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T_A) value during T2		39	*For 30 kHz SCS* $N_{TA\_new} = N_{TA\_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	s	5	

Table A.10.2.2.1.2-3: Cell specific test parameters for timing advance test

Parameter			Unit	Test1	
				T1	T2
TDD configuration		Config 1,2		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1,2	MHz	40: $N_{RB,c}$ = 106	
BWP BW		Config 1,2	MHz	40: $N_{RB,c}$ = 106	
DRX Cycle		Config 1,2	ms	Not Applicable	
DL CCA model		Config 1,2		As specified in clauseA.3.26.2.1	
UL CCA model		Config 1,2		As specified in clause A.3.26.2.2	
PDSCH Reference		Config 1,2		SR.1.1 CCA	
CORESET Reference		Config 1,2		CR.1.1 CCA	
TRS configuration		Config 1,2		TRS.1.2 TDD	
OCNG Patterns		Config 1,2		OCNG pattern 1	
SSB Configuration	Semi-static channel acces	Config 1,2		SSB.1 CCA	
	Dymamic channel acces	Config 1,2		SSB.2 CCA	
SMTC configuration		Config 1,2		SMTC.1 FR1	
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1	
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1,2		1	
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1,2		1	
UL CCA probability P_{CCA}		Config 1,2		1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		Config 1,2	dBm/30 kHz	-95	
		Config 3,6		-95	
$\hat{E}_s/I_{ot}$			dB	3	
$\hat{E}_s/N_{oc}$			dB	3	
Io Note3		Config 1,2	dBm/38.16MHz	-62.58	
Propagation condition			-	AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.

Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both

dynamic and semi-static channel occupancy configurations.

Table A.10.2.2.1.2-4: Sounding Reference Symbol Configuration for timing advance test

Field		Value	Comment
c-SRS	Config 1,2	24	Frequency hopping is disabled
b-SRS		0	
b-hop		0	
freqDomainPosition		0	Frequency domain position of SRS
freqDomainShift		0	
groupOrSequenceHopping		neither	No group or sequence hopping
SRS-PeriodicityAndOffset		sl5=4 for SCS 30kHz	Once every 5 slots
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage		Codebook	Codebook based UL transmission
startPosition		0	resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition.
nrofSymbols		n1	
repetitionFactor		n1	
combOffset-n2		0	transmissionComb setting
cyclicShift-n2		0	
nrofSRS-Ports		port1	Number of antenna ports used for SRS transmission
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.10.2.2.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.10.3 Signalling characteristics

A.10.3.1 Radio link monitoring

A.10.3.1.1 Introduction

In the test cases specified in clause A.10.3.1, any uplink signal transmitted by the UE is used for detecting the in-/out-of-sync state of the UE. In terms of measurement, the uplink signal is verified based on the UE output power:

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

A.10.3.1.2 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

A.10.3.1.2.1 Test purpose and environment

The purpose of this test is to verify that the UE properly detects the out-of-sync and in-sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1A.

In the test, UE is configured to perform RLM based on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.10.3.1.2.1-1. The test parameters are given in Tables A.10.3.1.2.1-2, A.10.3.1.2.1-3, and A.10.3.1.2.1-4 below. There are two cells in the test: Cell 1 is the E-UTRAN PCell, and Cell 2 is the FR1 PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

The test consists of three successive time periods, with time duration of T1, T2 and T3, respectively. Figure A.10.3.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40 ms) in the test.

Table A.10.3.1.2.1-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.3.1.2.1-2: General test parameters for PSCell out-of-sync testing in non-DRX mode.

Parameter		Unit	Value
			Test 1, Test 2
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
DL CCA model			As specified in clause A.3.20.2.1
UL CCA model			As specified in clause A.3.20.2.2
Duplex mode	Config 1,2		TDD
$BW_{channel}$	Config 1,2	MHz	40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1,2		[DLBWP.0.1]
DL dedicated BWP configuration	Config 1,2		[DLBWP.1.1]
UL initial BWP configuration	Config 1,2		[ULBWP.0.1]
UL dedicated BWP configuration	Config 1,2		[ULBWP.1.1]
TDD configuration	Config 1,2		TBD
CORESET Reference Channel	Config 1,2		TBD
SSB configuration	Config 1,2		TBD
DBT window configuration	Config 1,2		TBD
PDSCH/PDCCH subcarrier spacing	Config 1,2		30 kHz
PRACH Configuration	Config 1,2		TBD
SSB index assigned as RLM RS			0
OCNG parameters			[OP.1]
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		[1-0]
	Number of Control OFDM symbols		[2]
	Aggregation level	CCE	[8]
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	[4]
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	[4]
	DMRS precoder granularity		REG bundle size
	REG bundle size		[6]
DRX			OFF
Gap pattern ID			gp0

Layer 3 filtering			Enabled
T310 timer		ms	TBD
T311 timer		ms	TBD
N310			TBD
N311			TBD
CSI-RS configuration for CSI reporting	Config 1,2		[CSI-RS.2.1 TDD]
CSI-RS for tracking	Config 1,2		[TRS.1.2 TDD]
T1		s	TBD
T2		s	TBD
T3		s	TBD
D1		s	TBD
NOTE 1: All configurations are assigned to the UE prior to the start of time period T1. NOTE 2: UE-specific PDCCH is not transmitted after T1 starts. NOTE 3: E-UTRAN is in non-DRX mode under test.			

Table A.10.3.1.2.1-3: Cell-specific test parameters for PSCell out-of-sync testing in non-DRX mode.

Parameter		Unit	Test 1			Test 2		
			T1	T2	T3	T1	T2	T3
DL CCA probability P_{CCA_DL}	Note 6,8		TBD			TBD		
	Note 7,8							
UL CCA probability P_{CCA_UL}			TBD			TBD		
EPRE ratio of PDCCH DMRS to SSS		dB	4			4		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0			0		
EPRE ratio of PBCH DMRS to SSS		dB	0			0		
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR[Note 3,4] on RLM-RS	Config 1,2	dB	1	[-7]	-15	1	TBD	TBD
SNR on other channels and signals	Config 1,2	dB	1			1		
N_{oc}	Config 1,2	dBm/SCS	-95			-95		
Propagation condition			TDL-C 300 ns 100 Hz			TDL-C 300 ns 100 Hz		

NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.
NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.
NOTE 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3, respectively, in Figure A.10.3.1.2.1-1.
NOTE 5: The SNR values are specified for testing a UE which supports 2 RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 is A.3.6.
NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.3.1.2.1-4: Measurement gap configuration for PSCell out-of-sync testing in non-DRX mode.

Field	Test 1	Test 2
	Value	Value
gapOffset	0	0
NOTE 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. NOTE 2: Ensure that RLM RS is partially overlapped with measurement gap.		

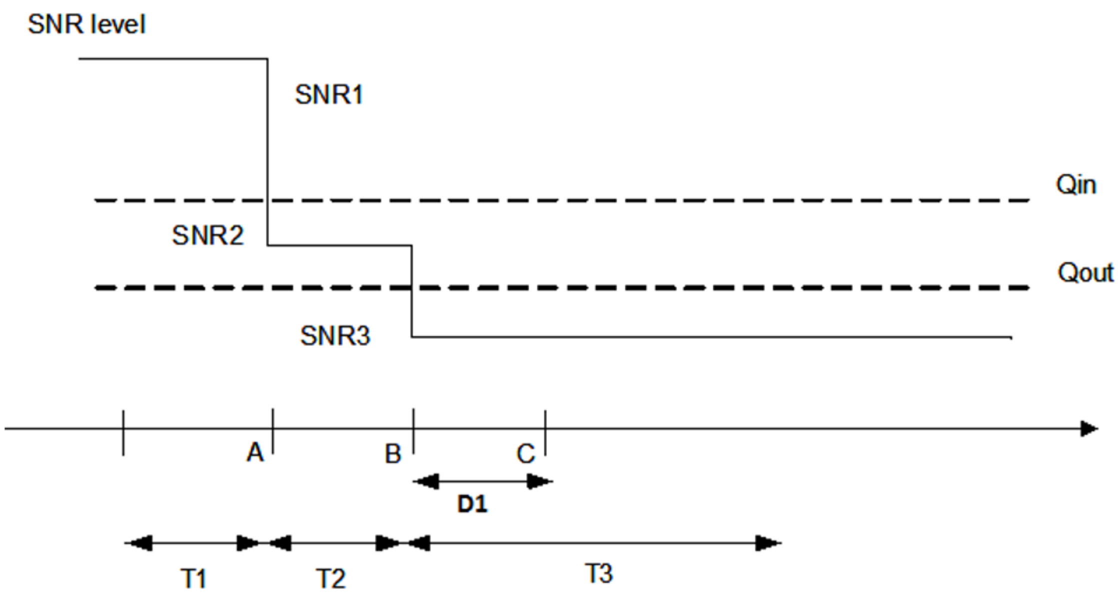

Figure A.10.3.1.2.1-1: SNR variation for out-of-sync testing.

A.10.3.1.2.2 Test requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

- During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.
- The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

In Test 1, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot <-7 dB.

In Test 2, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot ≥-7 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.1.3 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

A.10.3.1.3.1 Test purpose and environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1A.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.10.3.1.3.1-1. The test parameters are given in Tables A.10.3.1.3.1-2, and A.10.3.1.3.1-3 below. There are two cells in the test: Cell 1 is the E-UTRAN PCell, and Cell 2 is the FR1 PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model.

Table A.10.3.1.3.1-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.3.1.3.1-2: General test parameters for PSCell in-sync testing in non-DRX mode.

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
DL CCA model			As specified in clause A.3.20.2.1
UL CCA model			As specified in clause A.3.20.2.2
Duplex mode	Config 1,2		TDD
$BW_{channel}$	Config 1,2	MHz	40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1,2		[DLBWP.0.1]
DL dedicated BWP configuration	Config 1,2		[DLBWP.1.1]
UL initial BWP configuration	Config 1,2		[ULBWP.0.1]
UL dedicated BWP configuration	Config 1,2		[ULBWP.1.1]
TDD Configuration	Config 1,2		TBD
CORESET Reference Channel	Config 1,2		TBD
SSB Configuration	Config 1,2		TBD
DBT window configuration	Config 1,2		TBD
PDSCH/PDCCH subcarrier spacing	Config 1,2		30 kHz
PRACH Configuration	Config 1,2		TBD
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			*OFF*
Gap pattern ID			N/A
Layer 3 filtering			*Enabled*
T310 timer		ms	TBD
T311 timer		ms	TBD
N310			TBD
N311			TBD
CSI-RS configuration for CSI reporting	Config 1,2		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1,2		TRS.1.2 TDD
T1		s	TBD
T2		s	TBD
T3		s	TBD
T4		s	TBD
T5		s	TBD
D1		s	TBD
NOTE 1: All configurations are assigned to the UE prior to the start of time period T1. NOTE 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.10.3.1.3.1-3: Cell-specific test parameters for PSCell in-sync testing in non-DRX mode.

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
DL CCA probability P_{CCA_DL}			TBD				
UL CCA probability P_{CCA_UL}			TBD				
EPRE ratio of PDCCH DMRS to SSS		dB	4				
EPRE ratio of PDCCH to PDCCH DMRS		dB	0				
EPRE ratio of PBCH DMRS to SSS		dB	0				
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1,2	dB	1	[-7]	[-15]	[-4.5]	1
SNR on other channels and signals	Config 1,2	dB	1				
N_{oc}	Config 1,2	dBm/SCS	-95				
Propagation condition			TDL-C 300ns 100Hz				

NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.
NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.
NOTE 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.10.3.1.2.1-1.
Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

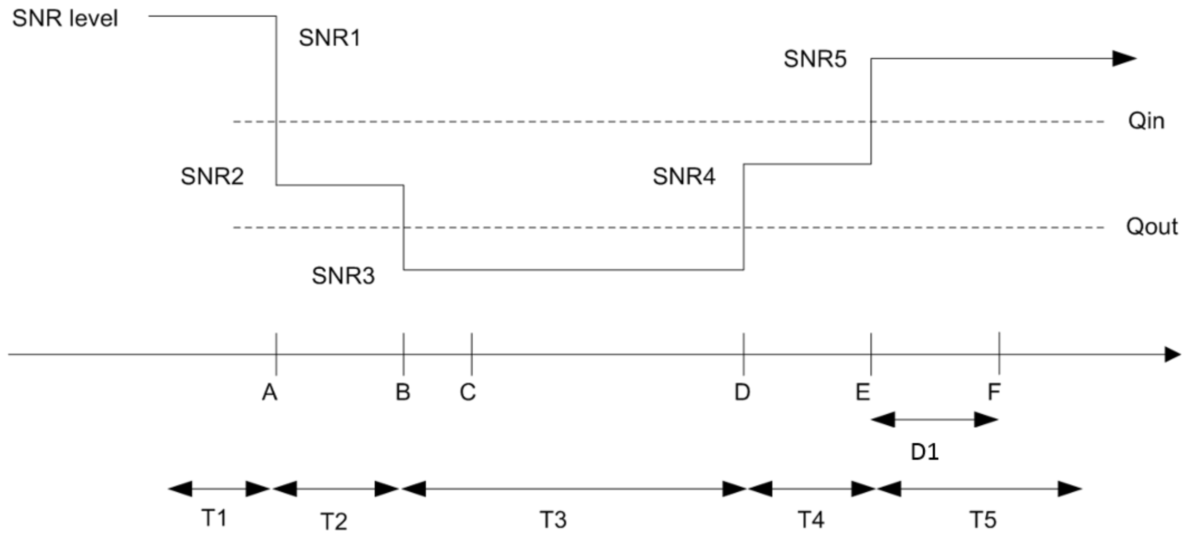

Figure A.10.3.1.2.1-1: SNR variation for in-sync testing.

A.10.3.1.3.2 Test requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.1.4 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode

A.10.3.1.4.1 Test purpose and environment

A.10.3.1.4.2 Test requirements

A.10.3.1.5 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode

A.10.3.1.5.1 Test purpose and environment

A.10.3.1.5.2 Test requirements

A.10.3.2 Interruption

A.10.3.2.1 E-UTRAN – NR interruptions during SCell operations with CCA

A.10.3.2.1.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during Scell operations on an NR SCC with CCA, This test will verify the interruption requirements for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1 and 8.3A. Supported test configurations are shown in table A.10.3.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.10.3.2.1.1-2 and A.10.3.2.1.1-3 below. The E-UTRAN cell specific test parameters are provided in Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR SCell. Both of cell 2 and cell 3 are subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the LTE PCell and NR PSCell are continuously scheduled in DL. The power of signals on cell 1,2 and 3 is not modified during the test.

Prior to T1, a connection is started with cell 2 as the PSCell, and measurements of cell 3 are configured with gap pattern 0, such that cell 3 is reported. This ensures that cell 3 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the SCell is configured.

The point in time at which the RRC message implying SCell addition is received at the UE antenna connector, defines the start of time period T1.

The point in time at which the MAC-CE message implying SCell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying SCell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying SCell release is received at the UE antenna connector, defines the start of time period T5.

Table A.10.3.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description
1	LTE FDD NR without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD NR without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.10.3.2.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the other two are NR RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated SCell		Cell3	Deactivated SCell on NR RF channel number 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	160	
T1	s	<10	
T2	s	<10	
T3	s	<10	
T4	s	<10	
T5	s	<10	

Table A.10.3.2.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

Parameter		Unit	Cell2	Cell3
			T1 T2 T3 T4 T5	T1 T2 T3 T4 T5
TDD configuration	Config 1,2		TDDConf.1.1 CCA	TDDConf.1.1 CCA
$BW_{channel}$	Config 1,2	MHz	40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
DL CCA model	Config 1,2		As specified in clause A.3.20.2.1	As specified in clause A.3.20.2.1
DL CCA probability for semi-static channel access Note6,8	P_{CCA_DL}		0.9375	0.9375
DL CCA probability for dynamic channel access Note7,8	$P_{CCA\_DL\_1}$		0.75	0.75
	$P_{CCA\_DL\_2}$		0.75	0.75
UL CCA model	Config 1,2		As specified in clause A.3.20.2.2	---
UL CCA probability for semi-static channel access	P_{CCA_UL}		0.87	---
UL CCA probability for dynamic channel access	P_{CCA_UL}		0.75	---
Initial BWP Configuration	Config 1,2		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP Configuration	Config 1,2		DLBWP.1.1	DLBWP.1.1
Initial UL BWP Configuration	Config 1,2		ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP Configuration	Config 1,2		ULBWP.1.1	ULBWP.1.1
PDSCH reference meassurement channel	Config 1,2		SR.1.1 CCA	-
RMSI CORESET Parameters	Config 1,2		CR.1.1 CCA	CR.1.1 CCA
PDCCH CORESET Parameters	Config 1,2		CCR.1.1 CCA	CCR.1.1 CCA
TRS configuration	Config 1,2		TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns			OP.1	OP.1
SSB configuration for semi-static channel access Note6,8	Config 1,2		SSB.1 CCA	SSB.1 CCA
SSB configuration for dynamic channel access Note7,8	Config 1,2		SSB.2 CCA	SSB.2 CCA
SMTC Configuration	Config 1,2		SMTC.1	SMTC.1
DBT window configuration	Config 1,2		DBT.1	DBT.1
TCI state			TCI.State.0	TCI.State.0
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS		dB	0	0
EPRE ratio of PBCH to PBCH DMRS		dB	0	0
EPRE ratio of PDCCH DMRS to SSS		dB	0	0
EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0
EPRE ratio of PDSCH DMRS to SSS		dB	0	0
EPRE ratio of PDSCH to PDSCH		dB	0	0
EPRE ratio of OCNG DMRS to SSS(Note 1)		dB	0	0
EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0	0
N_{oc} Note 2		dBm/15 kHz	-104	-104
SS-RSRP Note 3		dBm/15 kHz	-87	-87
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
Io Note3	Config 1,2	dBm/38.16MHz	-52.86	-52.86
Time offset to Cell1 Note 4		ms	3	3

Time offset to Cell2 Note 5	μs	-	3
Propagation Condition		AWGN	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess. Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.			

A.10.3.2.1.2 Test Requirements

The UE shall meet the interruption requirements for SCell addition on both the victim PSCC in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T1

The UE shall meet the interruption requirements for SCell activation on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for SCell deactivation on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T3. There shall be a single interruption with time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for deactivated SCell measurements on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T43. The interruptions shall be within the time window as specified in clause 8.3A,3

The UE shall meet the interruption requirements for SCell release on both the victim PSCell in clause 8.2.1 and the vicitim LTE PCell in clause 7.32 of [15] during time T5.

The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.3 SCell activation and deactivation delay

A.10.3.3.1 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 160 ms SCell measurement cycle

A.10.3.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

The supported test configurations are shown in Table A.10.3.3.1.1-1.

The test parameters are given in Table A.10.3.3.1.1-2 and cell-specific parameters for NR cells are provided in Table A.10.3.3.1.1-3 below. Cell-specific parameters for EUTRA PCell are provided in clause A.3.7.2.1.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in E-UTRA, Cell 2 (PSCell) on radio channel 2 (PSCC) in NR, and Cell3 (SCell) on radio channel 3 (SCC) in NR. Before the test starts the UE is connected to Cell 1 and Cell 2, but is not aware of Cell 3, as the UE is only monitoring PCC and PSCC. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted *m*, defines the start of time period T2. The UE shall be able to report a valid CSI in PSCell for the activated SCell at latest in slot $m +$ (T_{HARQ}+ $T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, as defined in clause 8.3A.2. The UE shall start reporting CSI in PSCell in first available uplink resource for CSI reporting following slot $m+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}}{\text{NR slot length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption shall fall within the time window specified in clause 8.3A.2.

The point in time at which the MAC message is received by at the UE antenna connector, in a slot # denoted *n*, defines the start of time period T3. The UE shall complete the activation at latest in slot $n+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}}{\text{NR slot length}}$. Any PSCell interruption shall fall within the time window specified in clause 8.3A.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received, while taking into account CCA failures on SCC.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.10.3.3.1.1-1: Supported test configurations for SCell Activation and Deactivation of known NR SCell with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle

Configuration	Description
1	PCC: LTE FDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	PCC: LTE TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.10.3.3.1.1-2: General test parameters for known SCell activation case with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	Three radio channels (1, 2, 3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1.
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
SCell measurement cycle (measCycleSCell)	ms	160	
Cell 3 timing offset to Cell 2	μs	0	
Time alignment error between Cell 3 and Cell 2	μs	≤ TAE as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time PCell and PSCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
T3	s	1	During this time the UE shall deactivate the SCell.
T_{HARQ}	ms	k_1×NR slot length	k_1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
$T_{CSI\_Reporting}$	ms	$10 + 5 \cdot 2^{\mu_{DL}}$	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] μ_{DL} is the subcarrier spacing configuration for DL

Table A.10.3.3.1.1-3: Cell specific test parameters for known SCell activation case with NR PSCell and SCell under CCA, 160 ms SCell measurement cycle

Parameter		Unit	Cell 2			Cell 3		
			T1	T2	T3	T1	T2	T3
Duplex mode	Config 1,2		TDD			TDD		
TDD configuration	Config 1,2		TDDConf.1.1 CCA			TDDConf.1.1 CCA		
$BW_{channel}$	Config 1,2	MHz	40: $N_{RB,c}$ = 106			40: $N_{RB,c}$ = 106		
DL CCA model			As specified in clause A.3.26.2.1			As specified in clause A.3.26.2.1		
UL CCA model			As specified in clause A.3.26.2.2			As specified in clause A.3.26.2.2		
DL CCA probability for semi-static channel access Note5,7	P_{CCA_DL}		0.9375			0.9375		
DL CCA probability for dynamic channel access Note6,7	$P_{CCA\_DL\_1}$		0.75			0.75		
	$P_{CCA\_DL\_2}$		0.75			0.75		
UL CCA probability for semi-static channel access	P_{CCA_UL}		0.87			0.87		
UL CCA probability for dynamic channel access	P_{CCA_UL}		0.75			0.75		
L_{CCA_DL} Note 8			2			2		
W_{CCA_DL} Note 8			$T_{activation\_time\_withCCA}$			$T_{activation\_time\_withCCA}$		
Initial downlink BWP configuration			DLBWP.0.2			DLBWP.0.2		
Initial uplink BWP configuration			ULBWP.0.1			ULBWP.0.1		
Dedicated downlink BWP configuration			DLBWP.0.2			DLBWP.0.2		
Dedicated uplink BWP configuration			ULBWP.0.1			ULBWP.0.1		
TCI state			TCI.State.0			TCI.State.0		
TRS Configuration	Config 1,2		TRS.1.2 TDD			TRS.1.2 TDD		
PDSCH Reference measurement channel	Config 1,2		SR.1.1 CCA			SR.1.1 CCA		
Dedicated CORESET parameters	Config 1,2		CCR.1.3 CCA			CCR.1.3 CCA		
RMSI CORESET parameters	Config 1,2		CR.1.1 CCA			CR.1.1 CCA		
OCNG Patterns Note1			OP.1			OP.1		
SSB Configuration for semi-static channel access Note5,7	Config 1,2		SSB.1 CCA			SSB.1 CCA		
SSB Configuration for dynamic channel access Note6,7	Config 1,2		SSB.2 CCA			SSB.2 CCA		
SMTC configuration			SMTC.1			SMTC.1		
DBT window configuration			DBT.1			DBT.1		
EPRE ratio of PSS to SSS		dB	0			0		
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS Note1								
EPRE ratio of OCNG to OCNG DMRS Note1								
N_{oc} Note2	Config 1,2	dBm/15kHz	-104			-104		
N_{oc} Note2	Config 1,2	dBm/SCS	-101			-101		
$\hat{E}_s/I_{ot}$		dB	17			17		
$\hat{E}_s/N_{oc}$		dB	17			17		
SS-RSRP Note3	Config 1,2	dBm/SCS	-84			-84		

Io[Note3]	Config 1,2	dBm/ 38.16MHz	-52.87	-52.87
Propagation condition		-	AWGN	
Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. Note 8: As specified in clause 8.3A for $L_{1,max}$, $L_{2,1,max}$, $L_{2,2,max}$, $L_{3,1,max}$, and $L_{3,2,max}$				

A.10.3.3.1.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot m + (T_{HARQ}+ $T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA} = T_{FirstSSB} + L_1{*}T_{rs}$ + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot m +1+$\frac{T_{HARQ}}{NR\ slot\ length}$ to slot m +1+$\frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB}$.

During T3, interruption on PSCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PSCell shall not be more than specified for EN-DC in clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.10.3.3.2 SCell Activation and Deactivation of known NR SCell with NR PSCell and NR SCell under CCA, 320 ms SCell measurement cycle

A.10.3.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 320 ms.

The supported test configurations are same as in Table A.10.3.3.1.1-1 above.

The test parameters are same as in Table A.10.3.3.1.1-2 above, except for parameters listed below in Table A.10.3.3.2.1-1. The cell-specific parameters are same as in Table A.10.3.3.1.1-3 above.

The test execution is the same as described in clause A.10.3.3.1 above.

Table A.10.3.3.2.1-1: General test parameters for known NR SCell activation with NR PSCell and SCell under CCA, 320 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.10.3.3.2.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot m + (T_{HARQ}+ $T_{activation\_time\_withCCA}$ + $T_{CSI\_reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA}$ = $T_{FirstSSB\_MAX}$ + $L_{2,1}$*T_{SMTC_MAX} + (1 +$L_{2,2}$)*T_{rs} + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot $m + 1 + \frac{T_{HARQ}}{NR\ slot\ length}$ to slot $m + 1 + \frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB\_MAX}$ + $L_{2,1}$* T_{SMTC_MAX}.

During T3, interruption on PSCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PSCell shall not be more than specified for EN-DC in clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.10.3.3.3 SCell Activation and Deactivation of unknown NR SCell with NR PSCell and NR SCell under CCA

A.10.3.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for NR SCell, with NR PSCell and NR SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is unknown to the UE at the time of activation.

The supported test configurations are same as in Table A.10.3.3.1.1-1 above.

The test parameters are same as in Table A.10.3.3.1.1-2 above, except for parameters listed below in Table A.10.3.3.3.1-1. The cell-specific parameters are same as in Table A.10.3.3.1.1-3 above.

The test execution is the same as described in clause A.10.3.3.1 above.

Table A.10.3.3.3.1-1: General test parameters for unknown NR SCell activation with NR PSCell and SCell under CCA

Parameter	Unit	Value	Comment
T1	s	0.1	During this time period PCell and PSCell shall be known and the SCell configured, but not detected.

A.10.3.3.3.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot m + (T_{HARQ}+ $T_{activation\_time\_withCCA}$ + $T_{CSI\_reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA}$ = $T_{FirstSSB\_MAX}$ + (1 + $L_{3,1}$)*T_{SMTC_MAX} + (2 + $L_{3,2}$)*T_{rs} + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PSCell shall not occur outside slot m +1+$\frac{T_{HARQ}}{NR\ slot\ length}$ to slot m +1+$\frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB\_MAX}$ + $L_{3,1}$* T_{SMTC_MAX}.

During T3, interruption on PSCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PSCell shall not be more than specified for EN-DC in clause 8.2.1.2.4.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.10.3.4 Beam failure detection and link recovery procedures

A.10.3.4.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.10.3.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.10.3.4.1.1-1, A.10.3.4.1.1-2, A.10.3.4.1.1-3 and A.10.3.4.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.4.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.10.3.4.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1.

Table A.10.3.4.1.1-1: Supported test configurations for FR1 PSCell with CCA

Configuration	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.3.4.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value		Comment
			Test 1	Test 2	
Active E-UTRA PCell			Cell 1	Cell 1	
E-UTRA RF Channel Number			1	1	
Active PSCell			Cell 2	Cell 2	
RF Channel Number			2	2	
DL CCA model			As specifieed in A.3.20.2.1	As specifieed in A.3.20.2.1	
UL CCA model			As specified in A.3.20.2.2	As specified in A.3.20.2.2	
Duplex mode	Config 1, 2		TDD	TDD	
BWchannel	Config 1, 2	MHz	40: NRB,c = 106	40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	ULBWP.1.1	
TDD configuration	Config 1, 2		TDDConf.1.1 CCA	TDDConf.1.1 CCA	
CORESET Reference Channel	Config 1, 2		CR.1.1 CCA	CR.1.1 CCA	
SSB Configuration	Config 1, 2		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	
DBT Window Configuration	Config 1, 2		DBT.1	DBT.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		30 KHz	30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.2-1	Table A.3.8.2.2-1	
SSB Index assigned as BFD RS (q_0)			0	0	
SSB Index assigned as CBD RS (q_1)			1	1	
OCNG parameters			OP.1	OP.1	
CP length			Normal	Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	1-0	
	Number of Control OFDM symbols		2	2	
	Aggregation level	CCE	8	[2]	

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	OFF	
Gap pattern ID			gp0	gp0	
gapOffset			0	0	
rlmInSyncOutOfSyncThreshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/SCS kHz	-95	-95	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer			pbfd4	pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration for CSI reporting	Config 1, 2		CSI-RS.2.1 TDD	CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1, 2		TRS.1.2 TDD	TRS.1.2 TDD	
SSB Index assigned as RLM RS			0,1	0,1	
T310 timer		ms	[1000]	[1000]	
N310			[2]	[2]	
T1		s	[0.2]	[0.2]	During this time the the UE shall be fully synchronized to cell 1
T2		s	[0.93]	[0.85]	
T3		s	[0.52]	[0.44]	
T4		s	[0]	[0]	
T5		s	[0.45]	[0.45]	
D1		s	[0.41]	[0.41]	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts. Note 3: E-UTRAN is in non-DRX mode under test.					

Table A.10.3.4.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
DL CCA probability $P_{CCA,DL}$	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability $P_{CCA,UL}$			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1, 2	dB	5	-3	-12	-12	-12
SNR_SSB of set q_1	Config 1, 2	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1, 2	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1, 2	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.3.4.1.1-4: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 2				
			T1	T2	T3	T4	T5
DL CCA probability $P_{CCA.DL}$	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability $P_{CCA.UL}$			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1, 2	dB	5	[2]	[-4]	[-4]	[-4]
SNR_SSB of set q_1	Config 1, 2	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1, 2	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1, 2	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

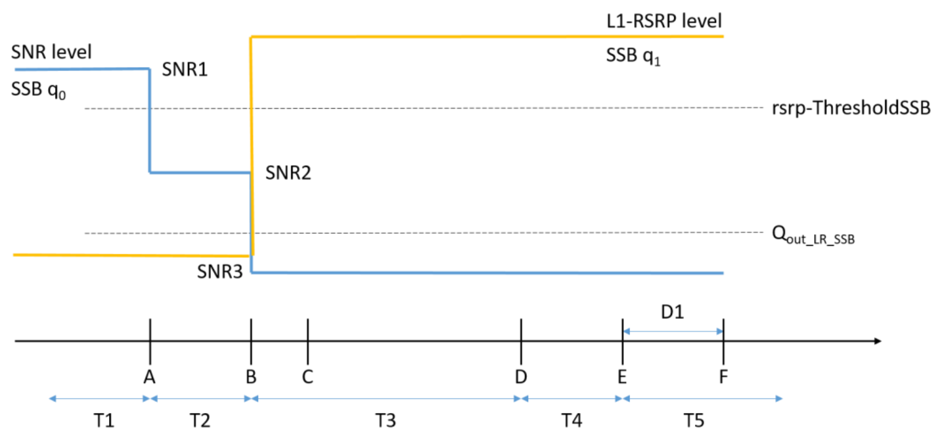

Figure A.10.3.4.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.10.3.4.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = [410] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.4.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.10.3.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.10.3.4.2.1-1, A.10.3.4.2.1-2, A.4.5.5.2.1-3 and A.10.3.4.2.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell which operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.10.3.4.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.10.3.4.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA model. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.10.3.4.2.1-1: Supported test configurations for FR1 PSCell with CCA

Configuration	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.3.4.2.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value		Comment
			Test 1	Test 2	
Active E-UTRA PCell			Cell 1	Cell 1	
E-UTRA RF Channel Number			1	1	
Active PSCell			Cell 2	Cell 2	
RF Channel Number			2	2	
DL CCA model			As specifieed in A.3.20.2.1	As specifieed in A.3.20.2.1	
UL CCA model			As specified in A.3.20.2.2	As specified in A.3.20.2.2	
Duplex mode	Config 1, 2		TDD	TDD	
BWchannel	Config 1, 2	MHz	40: NRB,c = 106	40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	ULBWP.1.1	
TDD configuration	Config 1, 2		TDDConf.1.1 CCA	TDDConf.1.1 CCA	
CORESET Reference Channel	Config 1, 2		CR.1.1 CCA	CR.1.1 CCA	
SSB Configuration	Config 1, 2		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	
DBT Window Configuration	Config 1, 2		DBT.1	DBT.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		30 KHz	30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.2-1	Table A.3.8.2.2-1	
SSB Index assigned as BFD RS (q_0)			0	0	
SSB Index assigned as CBD RS (q_1)			1	1	
OCNG parameters			OP.1	OP.1	
CP length			Normal	Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	1-0	
	Number of Control OFDM symbols		2	2	
	Aggregation level	CCE	8	[2]	

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			DRX.7	DRX.7	A.3.3.7
Gap pattern ID			N.A.	N.A.	
gapOffset			0	0	
rlmInSyncOutOfSyncThreshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/SCS kHz	-95	-95	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer			pbfd4	pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration for CSI reporting	Config 1, 2		CSI-RS.2.1 TDD	CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1, 2		TRS.1.2 TDD	TRS.1.2 TDD	
SSB Index assigned as RLM RS			0,1	0,1	
T310 timer		ms	[1000]	[1000]	
N310			[2]	[2]	
T1		s	[1]	[1]	During this time the the UE shall be fully synchronized to cell 1
T2		s	[9.01]	[8.37]	
T3		s	[5.16]	[4.52]	
T4		s	[0]	[0]	
T5		s	[3.89]	[3.39]	
D1		s	[3.85]	[3.85]	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts. Note 3: E-UTRAN is in non-DRX mode under test.					

Table A.10.3.4.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
DL CCA probability $P_{CCA,DL}$	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability $P_{CCA,UL}$			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1, 2	dB	5	-3	-12	-12	-12
SNR_SSB of set q_1	Config 1, 2	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1, 2	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1, 2	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.3.4.2.1-4: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 2				
			T1	T2	T3	T4	T5
DL CCA probability $P_{CCA,DL}$	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability $P_{CCA,UL}$			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1, 2	dB	5	[2]	[-4]	[-4]	[-4]
SNR_SSB of set q_1	Config 1, 2	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1, 2	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1, 2	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

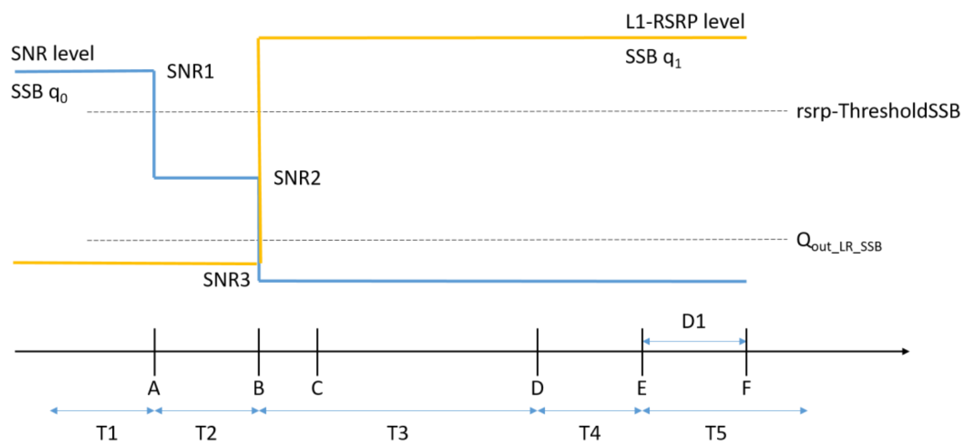

Figure A.10.3.4.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.10.3.4.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = [3850] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.5 Active BWP switching

A.10.3.5.1 UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC

A.10.3.5.1.1 Test Purpose and Environment

The purpose of this test is to verify the UL BWP switch delay requirement defined in clause 8.6.4.

The supported test configurations are shown in Table A.10.3.5.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in A.10.3.5.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.10.3.5.1.1-2. SRS configuration used in the test is specified in Table A.10.3.5.1.1-4.

The UE shall be configured with PRACH configuration on UL BWP on which the UE shall switch after the consistent UL LBT failure detection.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1 and Cell 2 on radio channel 2.
- UE is configured with 2 different UE-specific downlink and uplink bandwidth parts on Cell 2: DL BWP-1, DL BWP-2, UL BWP-1 and UL BWP-2 before starting the test. DL BWP-1 and DL BWP-2 always include bandwidth of the initial DL BWP and SSB. UL BWP-1 and UL BWP-2 always include bandwidth of the SRS.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is DL BWP-1.
- UE is indicated in *firstActiveUplinkBWP-Id* that the active UL BWP is UL BWP-1.
- UE is configured with *LBT-FailureRecoveryConfig* parameters for Cell 2.

The cell has constant signal levels throughout the test. The test consists of 2 successive time periods, with durations of T1 and T2, respectively.

During T1,

- Time period T1 starts when the UE has received the SRS configuration for periodic SRS transmission on active UL BWP-1.
- The UE shall perform UL CCA before SRS transmission.
- The parameter UL CCA probability P_{CCA} is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

During T2,

- T2 starts when the UE detects consistent UL LBT failures i.e. when total number of UL LBT failures in Cell 2 on active UL BWP-1 exceeds *lbt-FailureInstanceMaxCount* during *lbt-FailureDetectionTimer.*
- The UE upon detected consistent UL LBT failure starts the LBT recovery mechanism, which requires the UE to switch to active UL BWP-2 in Cell 2 and to send PRACH in the active UL BWP-2.
- Staring from T2, the UE shall be able to send PRACH in the active UL BWP-2 within the delay specified in clause 8.6.4.

Table A.10.3.5.1.1-1: Supported test configurations for UL BWP switch test in EN-DC

Config	Description
1	LTE FDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to be tested in one of the supported test configurations.	

Table A.10.3.5.1.1-2: General test parameters for UL BWP switch in EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel Number		1	One E-UTRA radio channel is used for this test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
lbt-FailureDetectionTimer [2]	ms	80	Parameter configured by IE: *LBT-FailureRecoveryConfig* [1]
lbt-FailureInstanceMaxCount [2]		4	Parameter configured by IE: *LBT-FailureRecoveryConfig* [1]
T1	s	0.1	During T1 consistent LBT failure is detected on active UL BWP-1
T2	s	0.1	During T2 UE sends PRACH on active UL BWP-2

Table A.10.3.5.1.1-3: NR Cell specific test parameters for UL BWP switch test in EN-DC

Parameter			Unit	Cell 2	
				T1	T2
TDD configuration		Config 1, 2		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1, 2		40 MHz: $N_{RB,c}$ = 106	
DL CCA model		Config 1, 2		As specified in clause A.3.20.2.1	
UL CCA model		Config 1, 2		As specified in clause A.3.20.2.2	
Active BWP ID		Config 1, 2		1, 2	
Initial DL BWP Configuration		Config 1, 2		DLBWP.0.2 Note 4	
Active DL BWP-1 Configuration		Config 1, 2		DLBWP.1.1 Note 4	
Active DL BWP-2 Configuration		Config 1, 2		DLBWP.1.3 Note 4	
Initial UL BWP Configuration		Config 1, 2		ULBWP.0.2 Note 4	
Active UL BWP-1 Configuration		Config 1, 2		ULBWP.1.1 Note 4	
Active UL BWP-2 Configuration		Config 1, 2		ULBWP.1.3 Note 4	
PDSCH Reference measurement channel		Config 1, 2		SR.1.1 CCA	
RMSI CORESET parameters		Config 1, 2		CR.1.1 CCA	
Dedicated CORESET parameters		Config 1, 2		CCR.1.1 CCA	
OCNG Patterns		Config 1, 2		OP.1	
SSB Configuration	Semi- static channel acces	Config 1, 2		SSB.1 CCA	
	Dymamic channel acces	Config 1, 2		SSB.2 CCA	
SMTC Configuration		Config 1, 2		SMTC.1 FR1	
Correlation Matrix and Antenna Configuration		Config 1, 2		1x2 Low	
TRS Configuration		Config 1, 2		TRS.1.2 TDD	
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1, 2		1	1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1, 2		1	1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1, 2		1	1
UL CCA probability (P_{CCA_UL})		Config 1, 2		0	1
PRACH configuration		Config 1, 2		N/A	Configuration #1 in Table A.3.8.2.1-1
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note 2		Config 1, 2	dBm/SCS	-101	
SS-RSRP Note 3		Config 1, 2	dBm/SCS	-84	
$\hat{E}_s/I_{ot}$		Config 1, 2	dB	17	
$\hat{E}_s/N_{oc}$		Config 1, 2	dB	17	
Io Note3		Config 1, 2	dBm/ 38.16MHz	-52.86	
Propagation Condition				AWGN	

Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5:	Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.20.2.
Note 6:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.10.3.5.1.1-4: Sounding Reference Symbol Configuration for UL BWP Switch Test in EN-DC

Field	Value	Comment
c-SRS	24	Frequency hopping is disabled
b-SRS	0	
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=4 for SCS 30kHz	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition.
nrofSymbols	n1	
repetitionFactor	n1	
combOffset-n2	0	transmissionComb setting
cyclicShift-n2	0	
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

A.10.3.5.1.2 Test Requirements

The UE capable of *bwp-SwitchingDelay type1* [2] shall start to transmit the PRACH on active UL BWP-2 of Cell 2 (PSCell) less than 21.5 ms from the beginning of time period T1.

The UE capable of *bwp-SwitchingDelay type2* [2] shall start to transmit the PRACH on active UL BWP-2 of Cell 2 (PSCell) less than 23 ms from the beginning of time period T1.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The above delay is calculated as follows:'

The active UL BWP switch delay from UL BWP-1 to UL BWP-2 can be expressed as:

$$T_{BWPswitchDelay}*T_{slot} + 1*T_{slot} + (1+ L_3)*T_{SSB,RO} + 10 \text{ ms}$$

Where:

- $T_{BWPswitchDelay}$ = 1 ms (2 slots) and 2.5 ms (5 slots) for *bwp-SwitchingDelay* [2] *type1* and *type2* UE capabilities according to clause 8.6.4.

- T_{slot} = It is the slot length. It is 0.5 ms for 30 kHz.
- L3 = It is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3= 0 during T2 since P_{CCA} = 1.
- $T_{SSB,RO}$ = 10 ms according to FR1 PRACH configuration 1.

This gives a total of 21.5 ms and 23 ms for *type1* and *type2* UE respectively.

A.10.3.5.2 DCI-based and Timer-based Active BWP Switch

A.10.3.5.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.10.3.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.10.3.5.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.10.3.5.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.10.3.5.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after DL slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after DL slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the beginning slot of the DL subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after DL slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after DL slot ($j+T_{BWPswitchDelay}$).

The starting time of PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

Table A.10.3.5.2.1.1-1: DL BWP switch supported test configurations

Config	Description
1	LTE FDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: A UE which fulfils the requirements in test case A.10.3.5.2.2 can skip the test cases in A.10.3.5.2.1. Note 3: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be test.	

Table A.10.3.5.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel Number		1	One E-UTRA radio channel is used for this test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
DL CCA model		As specified in clause A.3.26.2.1	
UL CCA model		As specified in clause A.3.26.2.2	
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.10.3.5.2.1.1-3.: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter			Unit	Cell 2
Frequency Range				FR1
Duplex mode		Config 1,2		TDD
TDD configuration		Config 1,2		TDDConf.1.1 CCA
$BW_{channel}$		Config 1,2		40 MHz: $N_{RB,c}$ = 106
Active BWP ID				1, 2
Initial DL BWP Configuration		Config 1,2		DLBWP.0.2 Note 4
Active DL BWP-1 Configuration		Config 1,2		DLBWP.1.1 Note 4
Active DL BWP-2 Configuration		Config 1,2		DLBWP.1.3 Note 4
Initial UL BWP Configuration		Config 1,2		ULBWP.0.2 Note 4
Active UL BWP-1 Configuration		Config 1,2		ULBWP.1.1 Note 4
Active UL BWP-2 Configuration		Config 1,2		ULBWP.1.3 Note 4
PDSCH Reference measurement channel		Config 1,2		SR.1.1 CCA
RMSI CORESET parameters		Config 1,2		CR.1.1 CCA
Dedicated CORESET parameters		Config 1,2		CCR.1.1 CCA
OCNG Patterns		Config 1,2		OP.1
SSB Configuration	Semi- static channel acces	Config 1,2		SSB.1 CCA
	Dymamic channel acces	Config 1,2		SSB.2 CCA
SMTC Configuration		Config 1,2		SMTC.1
TRS Configuration		Config 1,2		TRS.1.2 TDD
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1,2		1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1,2		1
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1
Correlation Matrix and Antenna Configuration				1x2 Low
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2		Config 1,2	dBm/SCS	-101
SS-RSRP Note 3		Config 1,2	dBm/SCS	-84
$\hat{E}_s/I_{ot}$		Config 1,2	dB	17
$\hat{E}_s/N_{oc}$		Config 1,2	dB	17
Io Note3		Config 1,2	dBm/38.16MHz	-59
Propagation Condition				AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5: Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.10.3.5.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot ($i+T_{BWPswitchDelay}+k1$), ($j+T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.10.3.5.2.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.10.3.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.10.3.5.2.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.10.3.5.2.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.10.3.5.2.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 3) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 3 before starting the test.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in SCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot ($i+T_{BWPswitchDelay}$).

PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot ($j+T_{BWPswitchDelay}$).

PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR SCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and SCell during BWP switch of PSCell, respectively.

Table A.10.3.5.2.2.1-1: DL BWP switch supported test configurations

Config	Description
1	LTE FDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: A UE which fulfils the requirements in test case A.10.3.5.2.2 can skip the test cases in A.10.3.5.2.1. Note 3: NR configuration is the same for PSCell and SCells. Note 4: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested.	

Table A.10.3.5.2.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel Number		1	One E-UTRA radio channel is used for this test
NR RF Channel Number		2, 3	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
Active SCell		Cell 3	SCell on RF channel number 3.
CP length		Normal	
DRX		OFF	
DL CCA model		As specified in clause A.3.26.2.1	
UL CCA model		As specified in clause A.3.26.2.2	
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell-individual offset for cells on RF channel number 3	dB	0	Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.10.3.5.2.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter			Unit	Cell 2	Cell 3
Frequency Range				FR1	
Duplex mode		Config 1,2		TDD	
TDD configuration		Config 1,2		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1,2		40 MHz: $N_{RB,c}$ = 106	
Active BWP ID				1, 2	0
Initial BWP Configuration		Config 1,2		DLBWP.0.2	DLBWP.0.2
Active BWP-0 Configuration		Config 1,2		NA	DLBWP.0.2
Active BWP-1 Configuration		Config 1,2		DLBWP.1.3	NA
Active BWP-2 Configuration		Config 1,2		DLBWP.1.1	NA
PDSCH Reference measurement channel		Config 1,2		SR.1.1 CCA	
RMSI CORESET parameters		Config 1,2		CR.1.1 CCA	
Dedicated CORESET parameters		Config 1,2		CCR.1.1 CCA	
OCNG Patterns		Config 1,2		OP.1	
SSB Configuration	Semi- static channel acces	Config 1,2		SSB.1 CCA	
	Dymamic channel acces	Config 1,2		SSB.2 CCA	
SMTC Configuration		Config 1,2		SMTC.1	
TRS Configuration		Config 1,2		TRS.1.2 TDD	
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1	1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1,2		1	1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1,2		1	1
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1	1
Correlation Matrix and Antenna Configuration				1x2	
Propagation Condition				AWGN	
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
N_{oc} Note 2		Config 1,2	dBm/SCS kHz	-101	-101
SS-RSRP Note 3		Config 1,2	dBm/SCS kHz	-84	-84
$\hat{E}_s/I_{ot}$		Config 1,2	dB	17	17
$\hat{E}_s/N_{oc}$		Config 1,2	dB	17	17
Io Note3		Config 1,2	dBm/38.16MHz	-59	-59

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5: Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.10.3.5.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot ($j+T_{BWPswitchDelay}+k11$).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot ($i+T_{BWPswitchDelay}+k1$), ($j+T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of k1 for type 1 and type 2 UE.

A.10.3.5.3 RRC-based Active BWP Switch

A.10.3.5.3.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.10.3.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.10.3.5.3.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.10.3.5.3.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.10.3.5.3.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$) as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$). The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

$T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.10.3.5.3.1.1-1: DL BWP switch supported test configurations

Config	Description
1	LTE FDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD, With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: The UE supporting EN-DC with only NR band(s) with shared spectrum access is required to be tested.	

Table A.10.3.5.3.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel Number		1	One E-UTRA radio channel is used for this test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
DL CCA model		As specified in clause A.3.26.2.1	
UL CCA model		As specified in clause A.3.26.2.2	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	s	0.2	

Table A.10.3.5.3.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter			Unit	Cell 2
Frequency Range				FR1
Duplex mode		Config 1,2		TDD
TDD configuration		Config 1,2		TDDConf.1.1 CCA
$BW_{channel}$		Config 1,2		40 MHz: $N_{RB,c}$ = 106
Active DL BWP ID				1, 2
Initial DL BWP Configuration		Config 1,2		DLBWP.0.2
Initial UL BWP Configuration		Config 1,2		ULBWP.0.2
Initial Condition	Active DL BWP-1 Configuration	Config 1,2		DLBWP.1.3
Final Condition	Active DL BWP-1 Configuration	Config 1,2		DLBWP.1.1
Initial UL BWP Configuration		Config 1,2		ULBWP.0.2
Active UL BWP-1 Configuration		Config 1,2		ULBWP.1.3
Active UL BWP-2 Configuration		Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel		Config 1,2		SR.1.1 CCA
RMSI CORESET parameters		Config 1,2		CR.1.1 CCA
Dedicated CORESET parameters		Config 1,2		CCR.1.1 CCA
OCNG Patterns		Config 1,2		OP.1
SSB Configuration	Semi- static channel acces	Config 1,2		SSB.1 CCA
	Dymamic channel acces	Config 1,2		SSB.2 CCA
SMTC Configuration		Config 1,2		SMTC.1
TRS Configuration		Config 1,2		TRS.1.2 TDD
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1,2		1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1,2		1
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1,2		1
Antenna Configuration				1x2
Propagation Condition				AWGN
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2		Config 1,2	dBm/SCS kHz	-101
SS-RSRP Note 3		Config 1,2	dBm/SCS kHz	-84
$\hat{E}_s/I_{ot}$		Config 1,2	dB	17
$\hat{E}_s/N_{oc}$		Config 1,2	dB	17
Io Note3		Config 1,2	dBm/38.16MHz	-59

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5: Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.10.3.5.3.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot ($i+ T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.10.3.6 PSCell addition and release delay

A.10.3.6.1 Addition and Release Delay of known NR PSCell on the carrier under CCA

A.10.3.6.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays on the carrier under CCA under EN-DC are within the requirements stated in clause 7.31A.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.10.3.6.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.10.3.6.1.1-2 and cell-specific parameters in A.10.3.6.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. After receiving the Event B1, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T5.

Table A.10.3.6.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.3.6.1.1-2: General Test Parameters for PSCell Addition and Release

Parameter		Unit	Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell on the carrier under CCA
Initial	Active PCell		Cell1	PCell on RF channel number 1.
	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final Condition	Active PCell		Cell1	PCell on RF channel number 1.
	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold RSRP	dBm	-93	Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
DL CCA model	Dynamic channel access Note 1, 3			As specified in clause A.3.20.2.1
	Semi-static channel access Note 2, 3			
UL CCA model	Dynamic channel access Note 1, 3			As specified in clause A.3.20.2.2
	Semi-static channel access Note 2,3			
Measurement gap pattern Id			0	Gaps are configured before T2 and released before T3.
PRACH configuration on cell2			FR1 PRACH configuration 2	Captured in A.3.8.2.1
CQI/PMI periodicity and offset configuration index on cell2			2ms	CQI reporting for PSCell every uplink subframe
Cell-individual offset for cells on RF channel number 1		dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on RF channel number 2		dB	0	Individual offset for cells on carrier frequency of cell2.
T304		ms	500	
L_{CCA_DL}			5	
T1		s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2		s	≥ $T_{identify\_irat\_cca\_without\_index}$	$T_{identify\_irat\_cca\_without\_index}$ is defined in clause 8.1.2.4.21A and 8.1.2.4.22A in TS 36.133 During this time the UE shall identify neighbour cell (cell2) and report event B1.
T3		s	≥ $T_{config\_PSCell\_withCCA}$	During this time the UE adds the PSCell. $T_{config\_PSCell\_withCCA}$ is defined in clause 7.31A.2
T4		s	0.5	During this time the UE sends CSI reports for PSCell.
T5		s	0.5	During this time the UE releases the PSCell.

NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.3.6.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test				
			T1	T2	T3	T4	T5
P_{CCA_DL} for dynamic channel access Note 5,7	-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75				
P_{CCA_DL} for semi-static channel access Note 6,7	-	P_{CCA_DL}=0.9375	P_{CCA_DL}=0.9375				
P_{CCA_UL} for dynamic channel access Note 5,7	-	1	1				
P_{CCA_UL} for semi-static channel access Note 6,7	-	1	1				

E-UTRA RF Channel Number		1,2	1	
NR RF Channel Number		1,2	2	
TDD configuration		1,2	TDDConf.1.1 CCA	
$BW_{channel}$		1,2	40: $N_{RB,c}$ = 106	
Initial BWP Configuration		1,2	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1,2	DLBWP.1.1 ULBWP.1.1	
PDSCH Reference		1,2	SR1.1 CCA	
RMSI CORESET Reference		1,2	CR1.1 CCA	
Dedicated CORESET Reference		1,2	CCR1.1 CCA	
OCNG Patterns		1,2	OP.1	
DBT window configuration		1, 2	DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA	
SMTC configuration		1,2	SMTC.1	
TRS Configuration		1,2	TRS.1.2 TDD	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)	dB	1,2	0	
N_{oc} Note2	dBm/15 kHz	1,2	N/A	-85
N_{oc} Note2	dBm/SCS	1,2	N/A	-82
$\hat{E}_s/I_{ot}$		1,2	-infinity	0
$\hat{E}_s/N_{oc}$		1,2	-infinity	0
SS-RSRP Note3	dBm/SCS	1,2	-infinity	-82
Io Note3	dBm/38.1MHz	1,2	N/A	-51
Propagation condition		1,2	AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.10.3.6.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest $T_{config\_PSCell\_withCCA}$ Note1 into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T5.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31A.2 [15]:

$$T_{config\_PSCell\_withCCA} = T_{RRC\_delay} + T_{processing} + T_{search\_withCCA} + T_{\Delta\_withCCA} + T_{PSCell\_DU\_withCCA} + 2 \text{ ms}$$

Where:

T_{RRC_delay} = 20 ms

$T_{processing}$ = 20 ms

$T_{search\_withCCA}$ = 0

$T_{\Delta\_withCCA} = (1+ L_2)*20$ ms

$T_{PSCell\_DU\_withCCA}$ = 20 ms.

L_2 is the number of SMTC occasions not available at the UE for fine time tracking and acquiring full timing information, where $L_2 \leq L_{CCA\_DL}$.

A.10.3.7 *Active* TCI state switching delay

A.10.4 Measurement procedure

A.10.4.1 Intra-frequency measurements

A.10.4.1.1 Event-triggered reporting tests on PSCC without gaps under non-DRX

A.10.4.1.1.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.10.4.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and two cells on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model: PSCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.10.4.1.1.2-1 and A.10.4.1.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information of Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
- In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
- In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.10.4.1.1.2-1: Supported test configurations

Configuration	Description
1	LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.10.4.1.1.2-2: General test parameters for intra-frequency event triggered reporting without gaps

Editor’s note: Table TBD

Table A.10.4.1.1.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

Editor’s note: Table TBD

A.10.4.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor’s note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.2 Event-triggered reporting tests on PSCC without gaps under DRX

A.10.4.1.2.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.10.4.1.2.2 Test parameters

A.10.4.1.2.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.3 Event-triggered reporting tests on PSCC with per-UE gaps under non-DRX

A.10.4.1.3.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.10.4.1.3.2 Test parameters

A.10.4.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.4 Event-triggered reporting tests on PSCC with per-UE gaps under DRX

A.10.4.1.4.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.10.4.1.4.2 Test parameters

A.10.4.1.4.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.5 Event-triggered reporting tests on SCC without gaps under non-DRX

A.10.4.1.5.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.10.4.1.5.2 Test parameters

A.10.4.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.6 Event-triggered reporting tests on SCC without gaps under DRX

A.10.4.1.6.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.10.4.1.6.2 Test parameters

A.10.4.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.7 Event-triggered reporting tests on SCC with per-UE gaps under non-DRX

A.10.4.1.7.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.10.4.1.7.2 Test parameters

A.10.4.1.7.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.8 Event-triggered reporting tests on SCC with per-UE gaps under DRX

A.10.4.1.8.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.10.4.1.8.2 Test parameters

A.10.4.1.8.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.1.9 RSSI measurement reporting on PSCC

A.10.4.1.9.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

A.10.4.1.9.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.1.9.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.9.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.4.1.9.2-2: General test parameters.

Editor's note: Table TBD

A.10.4.1.10 Channel occupancy measurement reporting on PSCC

A.10.4.1.10.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

A.10.4.1.10.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.1.10.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.10.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.4.1.10.2-2: General test parameters.

Editor's note: Table is TBD

A.10.4.1.11 RSSI measurement reporting on SCC

A.10.4.1.11.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

A.10.4.1.11.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.1.11.2-1. There are three cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, Cell 3 is SCell on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1, Cell 2, and Cell 3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.11.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.4.1.11.2-2: General test parameters.

Editor's note: Table TBD

A.10.4.1.12 Channel occupancy measurement reporting on SCC

A.10.4.1.12.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

A.10.4.1.12.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.1.12.2-1. There are three cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, and Cell 3 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1, Cell 2, Cell 3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.1.12.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.4.1.12.2-2: General test parameters.

Editor's note: Table is TBD

A.10.4.2 Inter-frequency measurements

A.10.4.2.1 RSSI measurement reporting

A.10.4.2.1.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 9.3A.8.

A.10.4.2.1.2 Test parameters

In the test, the UE is configured to perform inter-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.2.1.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The RSSI measurement is performed on an inter-frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.2.1.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.4.2.1.2-2: General test parameters.

Editor's note: Table TBD

A.10.4.2.2 Channel occupancy measurement reporting

A.10.4.2.2.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency channel occupancy measurement reporting requirements in Section 9.3A.9.

A.10.4.2.2.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.10.4.2.2.2-1. There are two cells in the test: Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The channel occupancy measurement is performed on an inter-frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.4.2.2.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.4.2.2.2-2: General test parameters.

Editor's note: Table is TBD

A.10.4.2.3 EN-DC event triggered reporting tests for FR1 with CCA cell without SSB time index detection when DRX is not used

A.10.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.3.1-1, A.10.4.2.3.1-2, and A.10.4.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.3.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.3.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.3.1-1.

Table A.10.4.2.3.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE TDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2	1, 2		Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 with CCA is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1,2	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	9	9	
A3-Offset	dB	Config 1,2	-6		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	s	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3 μs		Synchronous cells.
T1	s	Config 1,2	[5]		
T2	s	Config 1,2	[1]	[1]	

Table A.10.4.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test configuration	Cell 2		Cell 3	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2	1		2	
Duplex mode			Config 1,2	TDD			
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106			
TDD configuration			Config 1,2	TDDConf.1.1 CCA		TDDConf.1.1 CCA	
Initial DL BWP			Config 1,2	DLBWP.0.1		NA	
Initial UL BWP			Config 1,2	ULBWP.0.1		NA	
Dedicated DL BWP			Config 1,2	DLBWP.1.1		NA	
Dedicated UL BWP			Config 1,2	ULBWP.1.1		NA	
TRS configuration			Config 1,2	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1,2	SR.1.1 CCA		-	
CORESET Reference Channel			Config 1,2	CR.1.1 CCA		-	
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA		SSB.1 CCA	
	Dynamic channel access Note 6,7		Config 1,2	SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1,2	As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration			Config 1,2	SMTC.1		SMTC.4	
PDSCH/PDCCH		kHz	Config 1,2	30		30	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2	TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2	TBD		TBD	
EPRE ratio of PSS to SSS			Config 1,2	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	Config 1,2	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.						

A.10.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.4 EN-DC event triggered reporting tests for FR1 cell with CCA without SSB time index detection when DRX is used

A.10.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.4.1-1, A.10.4.2.4.1-2, and A.10.4.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.4.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.4.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.4.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.4.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE TDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2	1				One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2	1, 2				Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 with CCA is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3				NR cell 3 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1,2	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	9		9		
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Normal				
TimeToTrigger	s	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3 μs				Synchronous cells.
T1	s	Config 1,2	[5]				
T2	s	Config 1,2	[1.1]	[11]	[1.1]	[11]	

Table A.10.4.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test configuration	Cell 2				Cell 3			
				T1	T2	T3	T4	T1	T2	T3	T4
NR RF Channel Number			Config 1,2	1				2			
Duplex mode			Config 1,2	TDD							
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106							
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106							
TDD configuration			Config 1,2	TDDConf.1.1 CCA				TDDConf.1.1 CCA			
Initial DL BWP			Config 1,2	DLBWP.0.1				NA			
Initial UL BWP			Config 1,2	ULBWP.0.1				NA			
Dedicated DL BWP			Config 1,2	DLBWP.1.1				NA			
Dedicated UL BWP			Config 1,2	ULBWP.1.1				NA			
TRS configuration			Config 1,2	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2	OP.1				OP.1			
PDSCH Reference			Config 1,2	SR.1.1 CCA				-			
CORESET Reference Channel			Config 1,2	CR.1.1 CCA				-			
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA				SSB.1 CCA			
	Dynamic channel access Note 6,7		Config 1,2	SSB.2 CCA				SSB.2 CCA			
DBT window configuration			Config 1,2	As defined in A.3.28.1				As defined in A.3.28.1			
SMTC configuration			Config 1,2	SMTC.1				SMTC.4			
PDSCH/PDCCH		kHz	Config 1,2	30				30			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1,2	TBD				TBD			
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1,2	TBD				TBD			
EPRE ratio of PSS to SSS											
EPRE ratio of PBCH DMRS to SSS											
EPRE ratio of PBCH to PBCH DMRS											
EPRE ratio of PDCCH DMRS to SSS											
EPRE ratio of PDCCH to PDCCH DMRS			Config 1,2	0				0			
EPRE ratio of PDSCH DMRS to SSS											

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	Config 1,2	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.10.4.2.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3 Value	Test2&4 Value	Comment
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.10.4.2.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.10.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event

triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.5 EN-DC event triggered reporting tests for FR1 cell with CCA with SSB time index detection when DRX is not used

A.10.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.5.1-1, A.10.4.2.5.1-2, and A.10.4.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.5.1-1.

Table A.10.4.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE TDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2	1, 2		Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 with CCA is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1,2	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	9	9	
A3-Offset	dB	Config 1,2	-6		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	s	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3 μs		Synchronous cells.
T1	s	Config 1,2	[5]		
T2	s	Config 1,2	[1]	[1]	

Table A.10.4.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test configuration	Cell 2 T1	Cell 2 T2	Cell 3 T1	Cell 3 T2
NR RF Channel Number			Config 1,2	1		2	
Duplex mode			Config 1,2	TDD			
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106			
TDD configuration			Config 1,2	TDDConf.1.1 CCA		TDDConf.1.1 CCA	
Initial DL BWP			Config 1,2	DLBWP.0.1		NA	
Initial UL BWP			Config 1,2	ULBWP.0.1		NA	
Dedicated DL BWP			Config 1,2	DLBWP.1.1		NA	
Dedicated UL BWP			Config 1,2	ULBWP.1.1		NA	
TRS configuration			Config 1,2	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2	OP.1		OP.1	
PDSCH Reference			Config 1,2	SR.1.1 CCA		-	
CORESET Reference Channel			Config 1,2	CR.1.1 CCA		-	
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA		SSB.1 CCA	
	Dynamic channel access Note 6,7		Config 1,2	SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1,2	As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration			Config 1,2	SMTC.1		SMTC.4	
PDSCH/PDCCH		kHz	Config 1,2	30		30	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2	TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2	TBD		TBD	
EPRE ratio of PSS to SSS			Config 1,2	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	Config 1,2	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.10.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.6 EN-DC event triggered reporting tests for FR1 cell with CCA with SSB time index detection when DRX is used

A.10.4.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.6.1-1, A.10.4.2.6.1-2, and A.10.4.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.6.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE TDD NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2	1				One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2	1, 2				Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 with CCA (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 with CCA is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3				NR cell 3 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1,2	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	9		9		
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Normal				
TimeToTrigger	s	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3 μs				Synchronous cells.
T1	s	Config 1,2	[5]				
T2	s	Config 1,2	[1.1]	[11]	[1.1]	[11]	

Table A.10.4.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test configuration	Cell 2 T1	Cell 2 T2	Cell 2 T3	Cell 2 T4	Cell 3 T1	Cell 3 T2	Cell 3 T3	Cell 3 T4
NR RF Channel Number			Config 1,2	1				2			
Duplex mode			Config 1,2	TDD							
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106							
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106							
TDD configuration			Config 1,2	TDDConf.1.1 CCA				TDDConf.1.1 CCA			
Initial DL BWP			Config 1,2	DLBWP.0.1				NA			
Initial UL BWP			Config 1,2	ULBWP.0.1				NA			
Dedicated DL BWP			Config 1,2	DLBWP.1.1				NA			
Dedicated UL BWP			Config 1,2	ULBWP.1.1				NA			
TRS configuration			Config 1,2	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2	OP.1				OP.1			
PDSCH Reference			Config 1,2	SR.1.1 CCA				-			
CORESET Reference Channel			Config 1,2	CR.1.1 CCA				-			
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA				SSB.1 CCA			
	Dynamic channel access Note 6,7		Config 1,2	SSB.2 CCA				SSB.2 CCA			
DBT window configuration			Config 1,2	As defined in A.3.28.1				As defined in A.3.28.1			
SMTC configuration			Config 1,2	SMTC.1				SMTC.4			
PDSCH/PDCCH		kHz	Config 1,2	30				30			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1,2	TBD				TBD			
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1,2	TBD				TBD			
EPRE ratio of PSS to SSS			Config 1,2	0				0			
EPRE ratio of PBCH DMRS to SSS											
EPRE ratio of PBCH to PBCH DMRS											
EPRE ratio of PDCCH DMRS to SSS											
EPRE ratio of PDCCH to PDCCH DMRS											
EPRE ratio of PDSCH DMRS to SSS											

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	Config 1,2	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.						

Table A.10.4.2.6.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3 Value	Test2&4 Value	Comment
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.10.4.2.6.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.10.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event

triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.7 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used

A.10.4.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.7.1-1, A.10.4.2.7.1-2, and A.10.4.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.7.1-1.

Table A.10.4.2.7.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	E-UTRAN cell: LTE FDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
5	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod
6	E-UTRAN cell: LTE TDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2		Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
DL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2,3,4,5,6	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	9	9	
A3-Offset	dB	Config 1,2,3,4,5,6	-6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	s	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2,3,4,5,6	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 1,2,3,4,5,6	3 μs		Synchronous cells.
T1	s	Config 1,2,3,4,5,6	[5]		
T2	s	Config 1,2,3,4,5,6	[1]	[1]	

Table A.10.4.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test configuration	Cell 2		Cell 3	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3,4,5,6	1		2	
Duplex mode			Config 1,4	TDD		FDD	
			Config 2,3,5,6	TDD		TDD	
$BW_{channel}$		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3,6	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3,6	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
TDD configuration			Config 1,4	TDDConf.1.1 CCA		NA	
			Config 2,5	TDDConf.1.1 CCA		TDDConf.1.1	
			Config 3,6	TDDConf.1.1 CCA		TDDConf.2.1	
Initial DL BWP			Config 1,2,3,4,5,6	DLBWP.0.1		NA	
Initial UL BWP			Config 1,2,3,4,5,6	ULBWP.0.1		NA	
Dedicated DL BWP			Config 1,2,3,4,5,6	DLBWP.1.1		NA	
Dedicated UL BWP			Config 1,2,3,4,5,6	ULBWP.1.1		NA	
TRS configuration			Config 1,2,3,4,5,6	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3,4,5,6	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1,4	SR.1.1 CCA		SR.1.1 FDD	
			Config 2,5	SR.1.1 CCA		SR.1.1 TDD	
			Config 3,6	SR.1.1 CCA		SR.2.1 TDD	
CORESET Reference Channel			Config 1,4	CR.1.1 CCA		CR.1.1 FDD	
			Config 2,5	CR.1.1 CCA		CR.1.1 TDD	
			Config 3,6	CR.1.1 CCA		CR.2.1 TDD	
SSB parameters	Semi-static channel access Note 5,7 Semi-static channel access Note 5,7		Config 1,4	SSB.1 CCA		SSB.1 FR1	
			Config 2,5	SSB.1 CCA		SSB.1 FR1	
			Config 3,6	SSB.1 CCA		SSB.2 FR1	
	Dynamic channel access Note 6,7		Config 1,4	SSB.2 CCA		SSB.1 FR1	
			Config 2,5	SSB.2 CCA		SSB.1 FR1	
			Config 3,6	SSB.2 CCA		SSB.2 FR1	
DBT window configuration			Config 1,2,3,4,5,6	As defined in A.3.28.1		Not applicable	
SMTC configuration defined in A.3.11			Config 1,4	SMTC.2		SMTC.5	
			Config 2,3,5,6	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2,4,5	30		15	
			Config 3,6	30		30	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD		TBD	

UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD		TBD	
EPRE ratio of PSS to SSS			Config 1,2,3,4,5,6	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	Config 1,2,3,4,5,6	[-104]		-98	
N_{oc} Note2		dBm/SCS	Config 1,2,4,5	[-101]		-98	
			Config 3,6	[-101]		-95	
SS-RSRP Note 3		dBm/SCS	Config 1,2,4,5	-94	-94	-Infinity	-91
			Config 3,6	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	NR Config 1,2,4,5	-58.49	-58.49	-70.05	-62.26
		dBm/38.16MHz	NR Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3,4,5,6	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.10.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.8 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

A.10.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.8.1-1, A.10.4.2.8.1-2, and A.10.4.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.8.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	E-UTRAN cell: LTE FDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
5	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod
6	E-UTRAN cell: LTE TDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1				One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2				Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3				NR cell 3 is on NR RF channel number 2.
DL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2,3,4,5,6	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	9		9		
A3-Offset	dB	Config 1,2,3,4,5,6	-6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
CP length		Config 1,2,3,4,5,6	Normal				
TimeToTrigger	s	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		Config 1,2,3,4,5,6	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2,3,4,5,6	3 ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 1,2,3,4,5,6	3 μs				Synchronous cells.
T1	s	Config 1,2,3,4,5,6	[5]				
T2	s	Config 1,2,3,4,5,6	[1.1]	[11]	[1.1]	[11]	

Table A.10.4.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test configuration	Cell 2 T1	Cell 2 T2	Cell 2 T3	Cell 2 T4	Cell 3 T1	Cell 3 T2	Cell 3 T3	Cell 3 T4
NR RF Channel Number			Config 1,2,3,4,5,6	1				2			
Duplex mode			Config 1,4	TDD				FDD			
			Config 2,3,5,6	TDD				TDD			
$BW_{channel}$		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3,6	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3,6	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
TDD configuration			Config 1,4	TDDConf.1.1 CCA				NA			
			Config 2,5	TDDConf.1.1 CCA				TDDConf.1.1			
			Config 3,6	TDDConf.1.1 CCA				TDDConf.2.1			
Initial DL BWP			Config 1,2,3,4,5,6	DLBWP.0.1				NA			
Initial UL BWP			Config 1,2,3,4,5,6	ULBWP.0.1				NA			
Dedicated DL BWP			Config 1,2,3,4,5,6	DLBWP.1.1				NA			
Dedicated UL BWP			Config 1,2,3,4,5,6	ULBWP.1.1				NA			
TRS configuration			Config 1,2,3,4,5,6	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3,4,5,6	OP.1				OP.1			
PDSCH Reference measurement channel			Config 1,4	SR.1.1 CCA				SR.1.1 FDD			
			Config 2,5	SR.1.1 CCA				SR.1.1 TDD			
			Config 3,6	SR.1.1 CCA				SR.2.1 TDD			
CORESET Reference Channel			Config 1,4	CR.1.1 CCA				CR.1.1 FDD			
			Config 2,5	CR.1.1 CCA				CR.1.1 TDD			
			Config 3,6	CR.1.1 CCA				CR.2.1 TDD			
SSB parameters	Semi-static channel access Note 5,7 Semi-static channel access Note 5,7		Config 1,4	SSB.1 CCA				SSB.1 FR1			
			Config 2,5	SSB.1 CCA				SSB.1 FR1			
			Config 3,6	SSB.1 CCA				SSB.2 FR1			
	Dynamic channel access Note 6,7		Config 1,4	SSB.2 CCA				SSB.1 FR1			
			Config 2,5	SSB.2 CCA				SSB.1 FR1			
			Config 3,6	SSB.2 CCA				SSB.2 FR1			
DBT window configuration			Config 1,2,3,4,5,6	As defined in A.3.28.1				Not applicable			
SMTC configuration defined in A.3.11			Config 1,4	SMTC.2				SMTC.5			
			Config 2,3,5,6	SMTC.1				SMTC.4			
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2,4,5	30				15			
			Config 3,6	30				30			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD				TBD			

UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD		TBD	
EPRE ratio of PSS to SSS			Config 1,2,3,4,5,6	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	Config 1,2,3,4,5,6	[-104]		-98	
N_{oc} Note2		dBm/SCS	Config 1,2,4,5	[-101]		-98	
			Config 3,6	[-101]		-95	
SS-RSRP Note 3		dBm/SCS	Config 1,2,4,5	-94	-94	-Infinity	-91
			Config 3,6	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	NR Config 1,2,4,5	-58.49	-58.49	-70.05	-62.26
		dBm/38.16MHz	NR Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3,4,5,6	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.10.4.2.8.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.10.4.2.8.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.10.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.9 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

A.10.4.2.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.9.1-1, A.10.4.2.9.1-2, and A.10.4.2.9.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.9.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.2.9.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.9.1-1.

Table A.10.4.2.9.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	E-UTRAN cell: LTE FDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
5	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod
6	E-UTRAN cell: LTE TDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.9.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2		Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
DL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2,3,4,5,6	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	9	9	
A3-Offset	dB	Config 1,2,3,4,5,6	-6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	s	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2,3,4,5,6	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 1,2,3,4,5,6	3 μs		Synchronous cells.
T1	s	Config 1,2,3,4,5,6	[5]		
T2	s	Config 1,2,3,4,5,6	[1]	[1]	

Table A.10.4.2.9.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test configuration	Cell 2 T1	Cell 2 T2	Cell 3 T1	Cell 3 T2
NR RF Channel Number			Config 1,2,3,4,5,6	1		2	
Duplex mode			Config 1,4	TDD		FDD	
			Config 2,3,5,6	TDD		TDD	
$BW_{channel}$		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3,6	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3,6	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
TDD configuration			Config 1,4	TDDConf.1.1 CCA		NA	
			Config 2,5	TDDConf.1.1 CCA		TDDConf.1.1	
			Config 3,6	TDDConf.1.1 CCA		TDDConf.2.1	
Initial DL BWP			Config 1,2,3,4,5,6	DLBWP.0.1		NA	
Initial UL BWP			Config 1,2,3,4,5,6	ULBWP.0.1		NA	
Dedicated DL BWP			Config 1,2,3,4,5,6	DLBWP.1.1		NA	
Dedicated UL BWP			Config 1,2,3,4,5,6	ULBWP.1.1		NA	
TRS configuration			Config 1,2,3,4,5,6	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3,4,5,6	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1,4	SR.1.1 CCA		SR.1.1 FDD	
			Config 2,5	SR.1.1 CCA		SR.1.1 TDD	
			Config 3,6	SR.1.1 CCA		SR.2.1 TDD	
CORESET Reference Channel			Config 1,4	CR.1.1 CCA		CR.1.1 FDD	
			Config 2,5	CR.1.1 CCA		CR.1.1 TDD	
			Config 3,6	CR.1.1 CCA		CR.2.1 TDD	
SSB parameters	Semi-static channel access Note 5,7 Semi-static channel access Note 5,7		Config 1,4	SSB.1 CCA		SSB.1 FR1	
			Config 2,5	SSB.1 CCA		SSB.1 FR1	
			Config 3,6	SSB.1 CCA		SSB.2 FR1	
	Dynamic channel access Note 6,7		Config 1,4	SSB.2 CCA		SSB.1 FR1	
			Config 2,5	SSB.2 CCA		SSB.1 FR1	
			Config 3,6	SSB.2 CCA		SSB.2 FR1	
DBT window configuration			Config 1,2,3,4,5,6	As defined in A.3.28.1		Not applicable	
SMTC configuration defined in A.3.11			Config 1,4	SMTC.2		SMTC.5	
			Config 2,3,5,6	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2,4,5	30		15	
			Config 3,6	30		30	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD		TBD	

UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD		TBD	
EPRE ratio of PSS to SSS			Config 1,2,3,4,5,6	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	Config 1,2,3,4,5,6	[-104]		-98	
N_{oc} Note2		dBm/SCS	Config 1,2,4,5	[-101]		-98	
			Config 3,6	[-101]		-95	
SS-RSRP Note 3		dBm/SCS	Config 1,2,4,5	-94	-94	-Infinity	-91
			Config 3,6	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	NR Config 1,2,4,5	-58.49	-58.49	-70.05	-62.26
		dBm/38.16MHz	NR Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3,4,5,6	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.10.4.2.9.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.2.10 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

A.10.4.2.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.10.4.2.10.1-1, A.10.4.2.10.1-2, and A.10.4.2.10.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.10.4.2.10.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.10.4.2.10.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.10.4.2.10.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.10.4.2.10.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description
1	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	E-UTRAN cell: LTE FDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	E-UTRAN cell: LTE FDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
5	E-UTRAN cell: LTE TDD NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod
6	E-UTRAN cell: LTE TDD NR cell without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.10.4.2.10.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1				One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2				Two FR1 NR carrier frequencies are used. NR RF channel 1 is with CCA.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3				NR cell 3 is on NR RF channel number 2.
DL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2,3,4,5,6	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2,3,4,5,6	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	9		9		
A3-Offset	dB	Config 1,2,3,4,5,6	-6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
CP length		Config 1,2,3,4,5,6	Normal				
TimeToTrigger	s	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		Config 1,2,3,4,5,6	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2,3,4,5,6	3 ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 1,2,3,4,5,6	3 μs				Synchronous cells.
T1	s	Config 1,2,3,4,5,6	[5]				
T2	s	Config 1,2,3,4,5,6	[1.1]	[11]	[1.1]	[11]	

Table A.10.4.2.10.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test configuration	Cell 2 T1	Cell 2 T2	Cell 2 T3	Cell 2 T4	Cell 3 T1	Cell 3 T2	Cell 3 T3	Cell 3 T4
NR RF Channel Number			Config 1,2,3,4,5,6	1				2			
Duplex mode			Config 1,4	TDD				FDD			
			Config 2,3,5,6	TDD				TDD			
$BW_{channel}$		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3,6	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2,4,5	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3,6	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
TDD configuration			Config 1,4	TDDConf.1.1 CCA				NA			
			Config 2,5	TDDConf.1.1 CCA				TDDConf.1.1			
			Config 3,6	TDDConf.1.1 CCA				TDDConf.2.1			
Initial DL BWP			Config 1,2,3,4,5,6	DLBWP.0.1				NA			
Initial UL BWP			Config 1,2,3,4,5,6	ULBWP.0.1				NA			
Dedicated DL BWP			Config 1,2,3,4,5,6	DLBWP.1.1				NA			
Dedicated UL BWP			Config 1,2,3,4,5,6	ULBWP.1.1				NA			
TRS configuration			Config 1,2,3,4,5,6	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3,4,5,6	OP.1				OP.1			
PDSCH Reference measurement channel			Config 1,4	SR.1.1 CCA				SR.1.1 FDD			
			Config 2,5	SR.1.1 CCA				SR.1.1 TDD			
			Config 3,6	SR.1.1 CCA				SR.2.1 TDD			
CORESET Reference Channel			Config 1,4	CR.1.1 CCA				CR.1.1 FDD			
			Config 2,5	CR.1.1 CCA				CR.1.1 TDD			
			Config 3,6	CR.1.1 CCA				CR.2.1 TDD			
SSB parameters	Semi-static channel access Note 5,7 Semi-static channel access Note 5,7		Config 1,4	SSB.1 CCA				SSB.1 FR1			
			Config 2,5	SSB.1 CCA				SSB.1 FR1			
			Config 3,6	SSB.1 CCA				SSB.2 FR1			
	Dynamic channel access Note 6,7		Config 1,4	SSB.2 CCA				SSB.1 FR1			
			Config 2,5	SSB.2 CCA				SSB.1 FR1			
			Config 3,6	SSB.2 CCA				SSB.2 FR1			
DBT window configuration			Config 1,2,3,4,5,6	As defined in A.3.28.1				Not applicable			
SMTC configuration defined in A.3.11			Config 1,4	SMTC.2				SMTC.5			
			Config 2,3,5,6	SMTC.1				SMTC.4			
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2,4,5	30				15			
			Config 3,6	30				30			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD				TBD			

UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3,4,5,6	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3,4,5,6	TBD		TBD	
EPRE ratio of PSS to SSS			Config 1,2,3,4,5,6	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz	Config 1,2,3,4,5,6	[-104]		-98	
N_{oc} Note2		dBm/SCS	Config 1,2,4,5	[-101]		-98	
			Config 3,6	[-101]		-95	
SS-RSRP Note 3		dBm/SCS	Config 1,2,4,5	-94	-94	-Infinity	-91
			Config 3,6	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	NR Config 1,2,4,5	-58.49	-58.49	-70.05	-62.26
		dBm/38.16MHz	NR Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3,4,5,6	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.10.4.2.10.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3 Value	Test2&4 Value	Comment
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.10.4.2.10.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.10.4.2.10.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify_inter_cca_with_}$from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.3 L1-RSRP measurements for beam reporting

A.10.4.3.1 SSB based L1-RSRP measurement on PSCC when DRX is not used

A.10.4.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.10.4.3.1.2 Test parameters

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.4.3.1.2-1 and Table A.10.4.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1,2		freq1
DL CCA model	1,2		As specifieed in A.3.20.2.1
UL CCA model	1,2		As specified in A.3.20.2.2
Duplex mode	1,2		TDD
TDD Configuration	1,2		TDDConf.1.1 CCA
$BW_{channel}$	1,2	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1,2		SR.1.1 CCA
RMSI CORESET Reference Channel	1,2		CR.1.1 CCA
Dedicated CORESET Reference Channel	1,2		CCR.1.1 CCA
SSB configuration	1,2		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1,2		OP.1
Initial BWP Configuration	1,2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1,2		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1,2		DBT.1
TRS Configuration	1,2		TRS.1.2 TDD
DRX configuration	1,2		Off
reportConfigType	1,2		periodic
reportQuantity	1,2		ssb-Index-RSRP
Number of reported RS	1,2		2
L1-RSRP reporting period	1,2	slot	80
T1	1,2	s	5
T2	1,2	s	1
EPRE ratio of PSS to SSS	1,2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1,2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.			

Table A.10.4.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1,2		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1,2		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1,2		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1,2	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1,2	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1,2	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.10.4.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.3.2 SSB based L1-RSRP measurement on PSCC when DRX is used

A.10.4.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.10.4.3.2.2 Test parameters

There are two cells in the test, E-UTRAN Pcell (Cell 1) and FR1 PSCell (Cell 2) which operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.4.3.2.2-1 and Table A.10.4.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1,2		freq1
DL CCA model	1,2		As specifieed in A.3.20.2.1
UL CCA model	1,2		As specified in A.3.20.2.2
Duplex mode	1,2		TDD
TDD Configuration	1,2		TDDConf.1.1 CCA
$BW_{channel}$	1,2	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1,2		SR.1.1 CCA
RMSI CORESET Reference Channel	1,2		CR.1.1 CCA
Dedicated CORESET Reference Channel	1,2		CCR.1.1 CCA
SSB configuration	1,2		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1,2		OP.1
Initial BWP Configuration	1,2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1,2		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1,2		DBT.1
TRS Configuration	1,2		TRS.1.2 TDD
DRX configuration	1,2		DRX.3
reportConfigType	1,2		periodic
reportQuantity	1,2		ssb-Index-RSRP
Number of reported RS	1,2		2
L1-RSRP reporting period	1,2	slot	80
T1	1,2	s	5
T2	1,2	s	1
EPRE ratio of PSS to SSS	1,2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1,2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.			

Table A.10.4.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1,2		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1,2		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1,2		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1,2	dBm/15kHz	-94.65			
N_{oc} Note2	1,2	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1,2	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1,2	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.10.4.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.3.3 SSB based L1-RSRP measurement on SCC when DRX is not used

A.10.4.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.1.1-1.

Table A.10.4.3.3.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.10.4.3.3.2 Test parameters

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.4.3.3.2-1 and Table A.10.4.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
Active PScell	1,2		Cell 2
Active Scell	1,2		Cell 3
RF Channel Number	1,2		1: Cell 2 2: Cell 3
DL CCA model	1,2		As specifieed in A.3.20.2.1
UL CCA model	1,2		As specified in A.3.20.2.2
Duplex mode	1,2		TDD
TDD Configuration	1,2		TDDConf.1.1 CCA
$BW_{channel}$	1,2	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1,2		SR.1.1 CCA
RMSI CORESET Reference Channel	1,2		CR.1.1 CCA
Dedicated CORESET Reference Channel	1,2		CCR.1.1 CCA
SSB configuration	1,2		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1,2		OP.1
Initial BWP Configuration	1,2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1,2		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1,2		DBT.1
TRS Configuration	1,2		TRS.1.2 TDD
DRX configuration	1,2		Off
reportConfigType	1,2		periodic
reportQuantity	1,2		ssb-Index-RSRP
Number of reported RS	1,2		2
L1-RSRP reporting period	1,2	slot	80
T1	1,2	s	5
T2	1,2	s	1
EPRE ratio of PSS to SSS	1,2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1,2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with			

	downlink transmission burst and is not transmitted during the muted slots or during DBT window.

Table A.10.4.3.3.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1, 2		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1, 2		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1, 2		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1, 2	dBm/15kHz	-94.65			
N_{oc} Note2	1, 2	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1, 2	dB	0	0	-Infinity	3
SSB RSRP Note3	1, 2	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1, 2	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1, 2	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.10.4.3.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.3.4 SSB based L1-RSRP measurement on SCC when DRX is used

A.10.4.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.10.4.3.4.1-1.

Table A.10.4.3.4.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.10.4.3.4.2 Test parameters

There are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2), and FR1 SCell (Cell 3). Cell 2 and Cell 3 operate on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.4.3.4.2-1 and Table A.10.4.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.10.4.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
Active PScell	1,2		Cell 2
Active Scell	1,2		Cell 3
RF Channel Number	1,2		1: Cell 2 2: Cell 3
DL CCA model	1,2		As specifieed in A.3.20.2.1
UL CCA model	1,2		As specified in A.3.20.2.2
Duplex mode	1,2		TDD
TDD Configuration	1,2		TDDConf.1.1 CCA
$BW_{channel}$	1,2	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1,2		SR.1.1 CCA
RMSI CORESET Reference Channel	1,2		CR.1.1 CCA
Dedicated CORESET Reference Channel	1,2		CCR.1.1 CCA
SSB configuration	1,2		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1,2		OP.1
Initial BWP Configuration	1,2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1,2		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1,2		DBT.1
TRS Configuration	1,2		TRS.1.2 TDD
DRX configuration	1,2		DRX.3
reportConfigType	1,2		periodic
reportQuantity	1,2		ssb-Index-RSRP
Number of reported RS	1,2		2
L1-RSRP reporting period	1,2	slot	80
T1	1,2	s	5
T2	1,2	s	1
EPRE ratio of PSS to SSS	1,2	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1,2		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with			

	downlink transmission burst and is not transmitted during the muted slots or during DBT window.

Table A.10.4.3.4.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1, 2		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1, 2		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1, 2		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1, 2	dBm/15kHz	-94.65			
N_{oc} Note2	1, 2	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1, 2	dB	0	0	-Infinity	3
SSB RSRP Note3	1, 2	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1, 2	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1, 2	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.10.4.3.4.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 3.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.4 E-UTRAN–NR inter-RAT measurements on NR carrier frequency under CCA

A.10.4.4.1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.10.4.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21A of TS 36.133 [15] for E-UTRAN FDD-NR measurements under CCA and clause 8.1.2.4.22A of TS 36.133 [15] for E-UTRAN TDD-NR measurements under CCA.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters are given in Tables A.10.4.4.1.1-1, A.10.4.4.1.1-2, A.10.4.4.1.1-3 and A.10.4.4.1.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.4.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.4.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.10.4.4.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.4.4.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter		Unit	Test configuration	Value		Comment
				Test 1	Test 2	
E-UTRA RF Channel Number			1, 2	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number			1, 2	1,2		Two FR1 NR carrier frequency under CCA is used.
DL CCA model	Dynamic channel access Note 3, 5			As specified in clause A.3.20.2.1		
	Semi-static channel access Note 4, 5					
UL CCA model	Dynamic channel access Note 3, 5			As specified in clause A.3.20.2.2		
	Semi-static channel access Note 4, 5					
Active cell			1, 2	E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell			1, 2	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id			1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset			1, 2	39	19	As specified in TS 36.331 [16].
b2-Threshold1		dBm	1, 2	Note 1		E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR		dBm	1, 2	Note 2		SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [16]
Hysteresis		dB	1, 2	0		
CP length			1, 2	Normal		
TimeToTrigger		s	1, 2	0		
Filter coefficient			1, 2	0		L3 filtering is not used
DRX			1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells			1, 2	3μs		Synchronous cells.
T1		s	1, 2	5		
T2		s	1, 2	$\geq T_{identify\_irat\_cca\_without\_index}$	$\geq T_{identify\_irat\_cca\_without\_index}$	$T_{identify\_irat\_cca\_without\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133

NOTE 1: The value of b2-Threshold1 is defined in Table A.10.4.4.1.1-3
NOTE 2: The value of b2-Threshold2NR is defined in Table A.10.4.4.1.1-4
NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.4.4.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBDfor RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2	17	17
RSRP[Note5]	dBm/15kHz	1, 2	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2	-87	-87
Io[Note5]	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2	ETU70	

Antenna Configuration and Correlation Matrix Note6		1, 2	1x2 Low
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].			

Table A.10.4.4.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2		Cell 3	
			T1	T2	T2	T2
NR RF Channel Number		1, 2	2		3	
TDD configuration		1, 2	TDDConf.1.1 CCA		TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
P_{CCA_DL} for dynamic channel access Note 6,8		1, 2	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 7,8		1, 2	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 6,8		1, 2	1		1	
P_{CCA_UL} for semi-static channel access Note 7,8		1, 2	1		1	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1		OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1		SMTC.1	
DBT window configuration		1, 2	DBT.1		DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA		SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA		SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30		30	
b2-Threshold2NR	dBm/SCS	1, 2	NA		-98 for SS-RSRP	
		1, 2	NA		[TBD for SS-RSRQ]	
	dB	1, 2	NA		[TBD For SS-SINR]	

EPRE ratio of PSS to SSS		1, 2	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	1, 2	-98		-98	
N_{oc} Note2	dBm/SCS	1, 2	-95		-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-58.49	-58.49	-63.95	-56.16
Propagation Condition		1, 2	ETU70		ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low		1x2 Low	
NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.						

A.10.4.4.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index. $T_{identify\_irat\_cca\_without\_index}$ is defined in defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.4.2 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.10.4.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters are given in Tables A.10.4.4.2.1-1, A.10.4.4.2.1-2, A.10.4.4.2.1-3 and A.10.4.4.2.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.10.4.4.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.10.4.4.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.10.4.4.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.4.4.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter		Unit	Test configuration	Value				Comment
				Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number			1, 2	1				One E-UTRAcarrier frequency is used.
NR RF Chanel Number			1, 2	1,2				Two FR1 NR carrier frequency under CCA is used.
Active cell			1, 2	E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
DL CCA model	Dynamic channel access Note 3, 5			As specified in clause A.3.20.2.1				
	Semi-static channel access Note 4, 5							
UL CCA model	Dynamic channel access Note 3, 5			As specified in clause A.3.20.2.2				
	Semi-static channel access Note 4, 5							
Neighbour cell			1, 2	NR cell 3				NR cell 3 is on NR RF channel number 2.
Gap Pattern Id			1, 2	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset			1, 2	39		19		As specified in TS 36.331 [16].
b2-Threshold1		dBm	1, 2	Note 1				E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR		dBm	1, 2	Note 2				SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [16]
Hysteresis		dB	1, 2	0				
CP length			1, 2	Normal				
TimeToTrigger		s	1, 2	0				
Filter coefficient			1, 2	0				L3 filtering is not used
DRX			1, 2	DRX.9	DRX.10	DRX.9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour cells			1, 2	3μs				Synchronous cells.
T1		s	1, 2	5				
T2		s	1, 2	$\geq T_{identify\_irat\_cca\_without\_index}$				$T_{identify\_irat\_cca\_without\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133

NOTE 1: The value of b2-Threshold1 is defined in Table A.10.4.4.1.1-3 NOTE 2: The value of b2-Threshold2NR is defined in Table A.10.4.4.1.1-4 NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.4.4.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBD for RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17

$\hat{E}_s/I_{ot}$ Note5	dB	1, 2	17	17
RSRP Note5	dBm/15kHz	1, 2	-87	-87
SCH_RP Note5	dBm/15kHz	1, 2	-87	-87
Io Note5	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition Note6		1, 2	ETU70	
Antenna Configuration and Correlation Matrix Note6		1, 2	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].				

Table A.10.4.4.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2		Cell 3	
			T1	T2	T2	T2
NR RF Channel Number		1, 2	2		3	
TDD configuration		1, 2	TDDConf.1.1 CCA		TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
P_{CCA_DL} for dynamic channel access Note 6,8		1, 2	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 7,8		1, 2	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 6,8		1, 2	1		1	
P_{CCA_UL} for semi-static channel access Note 7,8		1, 2	1		1	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1		OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1		SMTC.1	
DBT window configuration		1, 2	DBT.1		DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA		SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA		SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30		30	
b2-Threshold2NR	dBm/SCS	1, 2	NA		-98 for SS-RSRP	
		1, 2	NA		[TBD for SS-RSRQ]	
	dB	1, 2	NA		[TBD For SS-SINR]	

EPRE ratio of PSS to SSS		1, 2	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	1, 2	-98		-98	
N_{oc} Note2	dBm/SCS	1, 2	-95		-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-58.49	-58.49	-63.95	-56.16
Propagation Condition		1, 2	ETU70		ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low		1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.10.4.4.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.4.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.10.4.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters are given in Tables A.10.4.4.3.1-1, A.10.4.4.3.1-2, A.10.4.4.3.1-3 and A.10.4.4.3.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.10.4.4.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.10.4.4.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.10.4.4.3.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.4.4.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

<table>
<tr><th colspan="2" rowspan="2">Parameter</th><th rowspan="2">Unit</th><th rowspan="2">Test configuration</th><th colspan="2">Value</th><th rowspan="2">Comment</th></tr>
<tr><th>Test 1</th><th>Test 2</th></tr>
<tr><td colspan="2">E-UTRA RF Channel Number</td><td></td><td>1, 2</td><td colspan="2">1</td><td>One E-UTRAcarrier frequency is used.</td></tr>
<tr><td colspan="2">NR RF Chanel Number</td><td></td><td>1, 2</td><td colspan="2">1,2</td><td>Two FR1 NR carrier frequency under CCA is used.</td></tr>
<tr><td rowspan="2">DL CCA model</td><td>Dynamic channel access Note 3, 5</td><td rowspan="2"></td><td rowspan="2"></td><td colspan="2" rowspan="2">As specified in clause A.3.20.2.1</td><td rowspan="2"></td></tr>
<tr><td>Semi-static channel access Note 4, 5</td></tr>
<tr><td rowspan="2">UL CCA model</td><td>Dynamic channel access Note 3, 5</td><td rowspan="2"></td><td rowspan="2"></td><td colspan="2" rowspan="2">As specified in clause A.3.20.2.2</td><td rowspan="2"></td></tr>
<tr><td>Semi-static channel access Note 4, 5</td></tr>
<tr><td colspan="2">Active cell</td><td></td><td>1, 2</td><td colspan="2">E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell)</td><td>E-UTRA cell 1 is on E-UTRA RF channel number 1.</td></tr>
<tr><td colspan="2">Neighbour cell</td><td></td><td>1, 2</td><td colspan="2">NR cell 3</td><td>NR cell 3 is on NR RF channel number 2.</td></tr>
<tr><td colspan="2">Gap Pattern Id</td><td></td><td>1, 2</td><td>0</td><td>4</td><td>As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].</td></tr>
<tr><td colspan="2">Measurement gap offset</td><td></td><td>1, 2</td><td>39</td><td>19</td><td>As specified in TS 36.331 [16].</td></tr>
<tr><td colspan="2">b2-Threshold1</td><td>dBm</td><td>1, 2</td><td colspan="2">Note 1</td><td>E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]</td></tr>
<tr><td colspan="2">b2-Threshold2NR</td><td>dBm</td><td>1, 2</td><td colspan="2">Note 2</td><td>SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [16]</td></tr>
<tr><td colspan="2">Hysteresis</td><td>dB</td><td>1, 2</td><td colspan="2">0</td><td></td></tr>
<tr><td colspan="2">CP length</td><td></td><td>1, 2</td><td colspan="2">Normal</td><td></td></tr>
<tr><td colspan="2">TimeToTrigger</td><td>s</td><td>1, 2</td><td colspan="2">0</td><td></td></tr>
<tr><td colspan="2">Filter coefficient</td><td></td><td>1, 2</td><td colspan="2">0</td><td>L3 filtering is not used</td></tr>
<tr><td colspan="2">DRX</td><td></td><td>1, 2</td><td colspan="2">OFF</td><td>DRX is not used</td></tr>
<tr><td colspan="2">Time offset between serving and neighbour cells</td><td></td><td>1, 2</td><td colspan="2">3μs</td><td>Synchronous cells.</td></tr>
<tr><td colspan="2">T1</td><td>s</td><td>1, 2</td><td colspan="2">5</td><td></td></tr>
<tr><td colspan="2">T2</td><td>s</td><td>1, 2</td><td>$\geq T_{identify\_irat\_cca\_with\_index}$</td><td>$\geq T_{identify\_irat\_cca\_with\_index}$</td><td>$T_{identify\_irat\_cca\_with\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133</td></tr>
<tr><td colspan="7">NOTE 1: The value of b2-Threshold1 is defined in Table A.10.4.4.3.1-3
NOTE 2: The value of b2-Threshold2NR is defined in Table A.10.4.4.3.1-4
NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.</td></tr>
</table>

Table A.10.4.4.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 with SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBD for RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2	17	17
RSRP[Note5]	dBm/15kHz	1, 2	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2	-87	-87
Io[Note5]	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2	ETU70	

Antenna Configuration and Correlation Matrix Note6		1, 2	1x2 Low
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].			

Table A.10.4.4.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Cell 2		Cell 3	
			T1	T2	T2	T2
NR RF Channel Number		1, 2	2		3	
TDD configuration		1, 2	TDDConf.1.1 CCA		TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
P_{CCA_DL} for dynamic channel access Note 6,8		1, 2	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 7,8		1, 2	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 6,8		1, 2	1		1	
P_{CCA_UL} for semi-static channel access Note 7,8		1, 2	1		1	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1		OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1		SMTC.1	
DBT window configuration		1, 2	DBT.1		DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA		SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA		SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30		30	
b2-Threshold2NR	dBm/SCS	1, 2	NA		-98 for SS-RSRP	
		1, 2	NA		[TBD for SS-RSRQ]	
	dB	1, 2	NA		[TBD For SS-SINR]	

EPRE ratio of PSS to SSS		1, 2	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	1, 2	-98		-98	
N_{oc} Note2	dBm/SCS	1, 2	-95		-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-58.49	-58.49	-63.95	-56.16
Propagation Condition		1, 2	ETU70		ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low		1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 8: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.10.4.4.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.4.4.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.10.4.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 with CCA on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters are given in Tables A.10.4.4.4.1-1, A.10.4.4.4.1-2, A.10.4.4.4.1-3 and A.10.4.4.4.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.10.4.4.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.10.4.4.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.10.4.4.4.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.10.4.4.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test configuration	Value				Comment
				Test 1	Test 2	Test 3	Test	
E-UTRA RF Channel Number			1, 2	1				One E-UTRAcarrier frequency is used.
NR RF Chanel Number			1, 2	1,2				Two FR1 NR carrier frequency under CCA is used.
DL CCA model	Dynamic channel access Note 3, 5			As specified in clause A.3.20.2.1				
	Semi-static channel access Note 4, 5							
UL CCA model	Dynamic channel access Note 3, 5			As specified in clause A.3.20.2.2				
	Semi-static channel access Note 4, 5							
Active cell			1, 2	E-UTRA cell 1 (PCell) and NR cell 2 with CCA (PSCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell			1, 2	NR cell 3				NR cell 3 is on NR RF channel number 2.
Gap Pattern Id			1, 2	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset			1, 2	39		19		As specified in TS 36.331 [16].
b2-Threshold1		dBm	1, 2	Note 1				E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR		dBm	1, 2	Note 2				SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 3 for event B2 [16]
Hysteresis		dB	1, 2	0				
CP length			1, 2	Normal				
TimeToTrigger		s	1, 2	0				
Filter coefficient			1, 2	0				L3 filtering is not used
DRX			1, 2	DRX.9	DRX.10	DRX.9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour cells			1, 2	3μs				Synchronous cells.
T1		s	1, 2	5				
T2		s	1, 2	$\geq T_{identify\_irat\_cca\_with\_index}$				$T_{identify\_irat\_cca\_with\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133

NOTE 1: The value of b2-Threshold1 is defined in Table A.10.4.4.4.1-3 NOTE 2: The value of b2-Threshold2NR is defined in Table A.10.4.4.4.1-4 NOTE 3: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 4: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 5: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.4.4.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 with SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration^{Note1}		2	6	
TDD uplink-downlink configuration^{Note1}		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel^{Note2}		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel^{Note2}		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns^{Note2}		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBD for RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA^{Note3}				
OCNG_RB^{Note3}				
N_{oc}^{Note4}	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17

$\hat{E}_s/I_{ot}$ Note5	dB	1, 2	17	17
RSRP Note5	dBm/15kHz	1, 2	-87	-87
SCH_RP Note5	dBm/15kHz	1, 2	-87	-87
Io Note5	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition Note6		1, 2	ETU70	
Antenna Configuration and Correlation Matrix Note6		1, 2	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].				

Table A.10.4.4.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Cell 2		Cell 3	
			T1	T2	T2	T2
NR RF Channel Number		1, 2	2		3	
TDD configuration		1, 2	TDDConf.1.1 CCA		TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
P_{CCA_DL} for dynamic channel access Note 6,8		1, 2	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 7,8		1, 2	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 6,8		1, 2	1		1	
P_{CCA_UL} for semi-static channel access Note 7,8		1, 2	1		1	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1		OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1		SMTC.1	
DBT window configuration		1, 2	DBT.1		DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA		SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA		SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30		30	
b2-Threshold2NR	dBm/SCS	1, 2	NA		-98 for SS-RSRP	
		1, 2	NA		[TBD for SS-RSRQ]	
	dB	1, 2	NA		[TBD For SS-SINR]	

EPRE ratio of PSS to SSS		1, 2	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	1, 2	-98		-98	
N_{oc} Note2	dBm/SCS	1, 2	-95		-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	4	4	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-58.49	-58.49	-63.95	-56.16
Propagation Condition		1, 2	ETU70		ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low		1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.10.4.4.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event

triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.10.5 Measurement performance

A.10.5.1 SS-RSRP

A.10.5.1.1 Intra-frequency measurement accuracy on a CCA serving cell

A.10.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.36.1.1 and 10.1.36.1.2 when the serving cell is subject to CCA.

A.10.5.1.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. Supported test configurations are shown in Table A.10.5.1.1.1-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.10.5.1.1.1-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7A.2.1. In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

Table A.10.5.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations for each supported band	

Table A.10.5.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter			Unit	Test 1		Test 2	
				Cell 2	**Cell 3**	**Cell 2**	**Cell 3**
Physical cell ID				489	0	489	0
SSB ARFCN				freq1			
Duplex mode		Config 1, 2		TDD			
TDD configuration		Config 1, 2		TDDConf.1.1 CCA			
$BW_{channel}$		Config 1, 2	MHz	40: $N_{RB,c}$ = 106			
Downlink initial BWP configuration				DLBWP.0.1			
Downlink dedicated BWP configuration				DLBWP.1.1			
Uplink initial BWP configuration				ULBWP.0.1			
Uplink dedicated BWP configuration				ULBWP.1.1			
TRS configuration		Config 1, 2		TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle			ms	Not Applicable			
PDSCH Reference measurement channel		Config 1, 2		SR.1.1 CCA		SR.1.1 CCA	
RMSI CORESET Reference Channel		Config 1, 2		CR.1.1 CCA		CR.1.1 CCA	
Control Channel RMC		Config 1, 2		CCR.1.1 CCA		CCR.1.1 CCA	
SSB configuration	Semi-static channel access	Config 1, 2		SSB.1 CCA (As defined in A.3.10A)	SSB.1 CCA (As defined in A.3.10A)	SSB.1 CCA (As defined in A.3.10A)	SSB.1 CCA (As defined in A.3.10A)
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)	SSB.2 CCA (As defined in A.3.10A)	SSB.2 CCA (As defined in A.3.10A)	SSB.2 CCA (As defined in A.3.10A)
Time offset with Cell 2		Config 1, 2	μs	-	3	-	3
SMTC configuration		Config 1, 2		TBD			
DBT Window Configuration		Config 1, 2		As defined in A.3.28.1			
DL CCA model		Config 1, 2		As specified in clause A.3.20.2.1			
UL CCA model		Config 1, 2		As specified in clause A.3.20.2.2			
OCNG Patterns				OP.1			
PDSCH/PDCCH subcarrier spacing		Config 1, 2	kHz	30kHz			
EPRE ratio of PSS to SSS			dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2	Config 1, 2	NR_CCA_FR1_I	dBm/15KhZ	-94		-110	
		NR_CCA_FR1_J				-109.5	
N_{oc} Note2	Config 1, 2	NR_CCA_FR1_I	dBm/SCS	-91		-107.0	
		NR_CCA_FR1_J				-106.5	
$\hat{E}_s/I_{ot}$			dB	2.46	-5.97	-0.01	-4.76
$\hat{E}_s/N_{oc}$			dB	6	1	3	0
SS-RSRP Note3	Config 1, 2	NR_CCA_FR1_I	dBm/SCS	-85	-90	-104.00	-107.00
		NR_CCA_FR1_J				-103.50	-106.50
Io Note3	Config 1, 2	NR_CCA_FR1_I	dBm/ 38.16MHz	-51.99		-69.94	
		NR_CCA_FR1_J				-69.44	
Propagation condition			-	AWGN			
Antenna configuration				1x2			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.							

Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.10.5.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.36.1.1 and 10.1.36.1.2.

A.10.5.1.2 Inter-frequency measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

A.10.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.37.1.1 and 10.1.37.1.2 for inter-frequency measurements with the testing configurations in Table A.10.5.1.2.1-1.

Table A.10.5.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description
1	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations on each supported band	

A.10.5.1.2.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7A.2.1. The test parameters for the Cell 2 and Cell 3 are given in Table A.10.5.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.10.5.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.10.5.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter		Config	Unit	Test 1		Test 2	
				Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN		1, 2		freq1	freq2	freq1	freq2
$BW_{channel}$		1, 2	MHz	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
Gap pattern ID				0		0	
Duplex mode		1, 2		TDD		TDD	
TDD configuration		1, 2		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
PDSCH Reference measurement channel		1, 2		SR.1.1 CCA		SR.1.1 CCA	
RMSI CORESET Reference Channel		1, 2		CR.1.1 CCA	-	CR.1.1 CCA	-
Dedicated CORESET Reference Channel		1, 2		CCR.1.1 CCA	-	CCR.1.1 CCA	-
SSB configuration	Semi-static channel access	1, 2		SSB.1 CCA (As defined in A.3.10A)		SSB.1 CCA (As defined in A.3.10A)	
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)		SSB.2 CCA (As defined in A.3.10A)	
OCNG Patterns		1, 2		OP.1		OP.1	
TRS configuration		1, 2		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP Configuration		1, 2		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration		1, 2		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	
Time offset with Cell 2		1, 2	µs	-	3	-	3
SMTC configuration		1, 2		TBD		TBD	
DBT Window Configuration		1, 2		As defined in A.3.28.1		As defined in A.3.28.1	
DL CCA model				As specified in clause A.3.20.2.1			
UL CCA model				As specified in clause A.3.20.2.2			
EPRE ratio of PSS to SSS		1, 2	dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG DMRS to SSS[Note 1]							
EPRE ratio of OCNG to OCNG DMRS [Note 1]							
N_{oc} [Note2]	NR_CCA_FR1_I	1, 2	dBm/15kHz	-94.65		(N_{oc} for Cell 3 +8dB)	-111
	NR_CCA_FR1_J						-110.5
N_{oc} [Note2]	NR_CCA_FR1_I	1, 2	dBm/SSB SCS	-91.65		(N_{oc} for C 3 +8dB)	-109.00
	NR_CCA_FR1_J						-108.50
$\hat{E}_s/I_{ot}$		1, 2	dB	10	10	13	-3
SS-RSRP[Note3]	NR_CCA_FR1_I	1, 2	dBm/SCS	-81.65		(RSRP for Cell 3 +25dB)	-111.00
	NR_CCA_FR1_J						-110.50

Io[Note3]	R_CCA_FR1_I	1, 2	dBm/38.16MHz	-50.19		(Io for Channel 3 +19.75dB)	-75.19
	NR_CCA_FR1_J						-74.69
$\hat{E}_s/N_{oc}$		1, 2	dB	10	10	13	-3
Propagation condition		1, 2	-	AWGN		AWGN	
Antenna configuration				1x2		1x2	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.							

A.10.5.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the Absolute requirement in clause 10.1.4.1.1 and Relative requirement in clause 10.1.37.1.1 and 10.1.37.1.2.

A.10.5.2 SS-RSRQ

A.10.5.2.1 Intra-frequency measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

A.10.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.29.1.1.

A.10.5.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.10.5.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.10.5.2.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7A.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.10.5.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Config	Description
1	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

Table A.10.5.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter			Unit	Test 1		Test 3	
				Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN				freq1			
Duplex mode	Config 1, 2			TDD			
TDD configuration	Config 1, 2			TDDConf.1.1 CCA			
$BW_{channel}$	Config 1, 2		MHz	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP			DLBWP.0.1			
	Dedicated DL BWP			DLBWP.1.1			
	Initial UL BWP			ULBWP.0.1			
	Dedicated UL BWP			ULBWP.1.1			
DRX Cycle			ms	Not Applicable			
PDSCH Reference measurement channel	Config 1, 2			SR.1.1 CCA		SR.1.1 CCA	
RMSI CORESET Reference Channel	Config 1, 2			CR.1.1 CCA		CR.1.1 CCA	
Control Channel RMC	Config 1, 2			CCR.1.1 CCA		CCR.1.1 CCA	
TRS configuration	Config 1, 2			TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns				OP. 1			
SS-RSSI-Measurement				Not Applicable			
Time offset with Cell 2	Config 1, 2		μs	-	3	-	3
SMTC configuration	Config 1, 2			TBD			
SSB configuration	Semi-static channel access	Config 1, 2		SSB.1 CCA (As defined in A.3.10A)			
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)			
PDSCH/PDCCH subcarrier spacing	Config 1, 2		kHz	30kHz			
DBT Window Configuration	Config 1, 2			As defined in A.3.28.1			
DL CCA model	Config 1, 2			As specified in clause A.3.20.2.1			
UL CCA model	Config 1, 2			As specified in clause A.3.20.2.2			
EPRE ratio of PSS to SSS			dB	0	0	0	0
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2	Config1, 2	NR_CCA_FR1_I	Bm/15kHz	-91		-110	
		NR_CCA_FR1_J				-109.5	
N_{oc} Note2	Config 1, 2	NR_CCA_FR1_I	dBm/SC S	-88		-107	
		NR_CCA_FR1_J				-106.5	
$\hat{E}_s/I_{ot}$			dB	-1.76		-5.46	-5.46
$\hat{E}_s/N_{oc}$			dB	3	3	-4	-4
SS-RSRP Note3	Config 1, 2	NR_CCA_FR1_I	dBm/SCS	-85	-85	-111	-111
		NR_CCA_FR1_J				-110.5	-110.5
SS-RSRQ Note3		NR_CCA_FR1_I	dB	-14.77	-14.77	-17.34	-17.34
		NR_CCA_FR1_J					
Io Note3	Config 1, 2	NR_CCA_FR1_I	dBm/ 38.16MHz	-50			-73.4
		NR_CCA_FR1_J					-72.9
Propagation condition			-	AWGN	AWGN	AWGN	AWGN

Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: NR operating band groups are as defined in Clause 3.5.2. Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.					

A.10.5.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.29.1.1.

A.10.5.2.2 Inter-frequency measurement accuracy with FR1 CCA serving cell and FR1 CCA target cell

A.10.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limitsThis test will verify the requirements in clause 10.1.30.1.1 and 10.1.30.1.2 for inter-frequency measurements with the testing configurations in Table A.10.5.2.2.2-1.

A.10.5.2.2.2 Test Parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.4.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.10.5.2.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.10.5.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Config	Description
1	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

Table A.10.5.2.2.2-2: SS-RSRQ Inter frequency test parameters

Parameter			Unit	Test 1		Test 2		Test 3	
				Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN				freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		Config 1, 2		TDD					
TDD configuration		Config 1, 2		TDDConf.1.1 CCA					
$BW_{channel}$		Config 1, 2		40: $N_{RB,c}$ = 106					
BWP BW		Config 1, 2	MHz	40: $N_{RB,c}$ = 106					
Gap pattern ID				0					
DRX Cycle			ms	Not Applicable					
PDSCH Reference measurement channel		Config 1, 2		SR.1.1 CCA		SR.1.1 CCA		SR.1.1 CCA	
RMSI CORESET Reference Channel		Config 1, 2		CR.1.1 CCA		CR.1.1 CCA		CR.1.1 CCA	
Dedicated CORESET Reference Channel		Config 1, 2		CCR.1.1 CCA		CCR.1.1 CCA		CCR.1.1 CCA	
TRS configuration		Config 1, 2		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns				OCNG pattern 1					
Time offset with Cell 2		Config 1, 2	μs	-	3	-	3	-	3
SMTC configuration		Config 1, 2		TBD					
SSB configuration	Semi-static channel access	Config 1, 2		SSB.1 CCA (As defined in A.3.10A)					
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)					
DBT Window Configuration		Config 1, 2		As defined in A.3.28.1					
PDSCH/PDCCH subcarrier spacing		Config 1, 2	kHz	30 kHz					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1, 2	NR_CCA_FR1_I	dBm/15kHz	-86.27	-86.27	-113	-113	-112	-112
		NR_CCA_FR1_J						-111.5	-111.5
N_{oc} Note2	Config 1, 2	NR_CCA_FR1_I	dBm/SCS	-83.27	-83.27	-110	-110	-109	-109
		NR_CCA_FR1_J						-108.5	-108.5
$\hat{E}_s/I_{ot}$			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
$\hat{E}_s/N_{oc}$			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
SS-RSRP Note3	Config 1, 2	NR_CCA_FR1_I	dBm/SCS	-85.02	-85.02	-111.75	-111.75	-106	-110.75
		NR_CCA_FR1_J						-105.5	-110.25
SS-RSRQ Note3		NR_CCA_FR1_I	dB	-14.77	-14.77	-40.59	-40.59	-12.56	-14.76
		NR_CCA_FR1_J							
Io Note3	Config 1, 2	NR_CCA_FR1_I	dBm/ 38.16MHz	-50	-50	-76.73	-76.73	-73.19	-75.23
		NR_CCA_FR1_J						-72.69	-74.73
Propagation condition				AWGN	AWGN	AWGN	AWGN	AWGN	AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRQ, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	NR operating band groups are as defined in Section 3.5.2.
Note 6:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.10.5.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.30.1.1 and 10.1.30.1.2.

A.10.5.3 SS-SINR

A.10.5.4 L1-RSRP measurement for beam reporting with CCA serving cell

A.10.5.4.1 SSB based L1-RSRP measurement

A.10.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.33.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.10.5.4.1.1-1.

Table A.10.5.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to pass in one of the supported test configurations	

A.10.5.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell under CCA (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model.

Two sub-tests (Test 1 and Test 2) are provided with different N_{oc} on Cell 2. The test parameters and applicability for Cell 1 are defined in A.3.7A.2. The test parameters for the Cell 2 are given in Table A.10.5.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.10.5.4.1.2-1.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.10.5.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2

SSB GSCN		1,2		freq1	freq1
DL CCA model		1,2		As specifieed in A.3.20.2.1	As specifieed in A.3.20.2.1
UL CCA model		1,2		As specified in A.3.20.2.2	As specified in A.3.20.2.2
Duplex mode		1,2		TDD	TDD
TDD Configuration		1,2		TDDConf.1.1 CCA	TDDConf.1.1 CCA
$BW_{channel}$		1,2	MHz	40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
Duplex mode		1,2		TDD	TDD
TDD configuration		1,2		TDDConf.1.1 CCA	TDDConf.1.1 CCA
PDSCH Reference measurement channel		1,2		SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel		1,2		CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel		1,2		CCR.1.1 CCA	CCR.1.1 CCA
SSB configuration for Semi-static channel access		1,2		SSB.3 CCA	SSB.3 CCA
SSB configuration for Dynamic channel access		1,2		SSB.4 CCA	SSB.4 CCA
OCNG Patterns		1,2		OP.1	OP.1
TRS configuration		1,2		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration		1,2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration		1,2		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
DBT Window Configuration		1,2		DBT.1	DBT.1
reportConfigType		1,2		periodic	periodic
reportQuantity		1,2		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS		1,2		2	2
L1-RSRP reporting period		1,2		slot80	slot80
EPRE ratio of PSS to SSS		1,2	dB	0	0
EPRE ratio of PBCH DMRS to SSS		1,2			
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH DMRS					
EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
N_{oc} Note2	NR_TDD_FR1_I	1,2	dBm/15kHz	-94.65	[-113]
N_{oc} Note2	NR_TDD_FR1_I	1,2	dBm/SCS	-91.65	[-110]
$\hat{E}_s/I_{ot}$		1,2	dB	10	-3
SS-RSRP Note3	NR_TDD_FR1_I	1,2	dBm/SCS	-81.65	[-113]
Io Note3	NR_TDD_FR1_I	1,2	dBm/ 38.16MHz	-50.19	[-77.19]

$\hat{E}_s/N_{oc}$	1,2	dB	10	-3
Propagation condition	1,2		AWGN	AWGN
Antenna configuration	1,2		1x2	1x2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification				

A.10.5.4.1.3 Test Requirements

In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.33.1.

A.10.5.5 RSSI

A.10.5.5.1 RSSI measurement accuracy on PSCC with CCA

A.10.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

A.10.5.5.1.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. RSSI is measured on channel number 1. Supported test configurations are shown in table A.10.5.5.1.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.10.5.5.1.2-2 and A.10.5.5.1.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.5.1.2-1: RSSI supported test configurations

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.5.5.1.2-2: RSSI test parameters

Parameter		Configurations	Unit	Test 1
				Cell 2
RF Channel Number				1
$BW_{channel}$			MHz	40
SSB configuration	Semi-static channel access Note 1, 3	1,2		SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2		SSB.2 CCA
P_{CCA_DL}				TBD
P_{CCA_UL}				TBD
DL CCA model				As specifieed in A.3.20.2.1
UL CCA model				As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth
Channel access bandwidth			MHz	20
DRX Cycle configuration			ms	Not Applicable
PDSCH Reference measurement channel				SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA
OCNG Patterns				OP.1
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	-Infinity
SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)				-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-87
Propagation condition			-	AWGN
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.				

Note 2:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 3:	For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.5.5.1.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.10.5.5.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.10.5.5.2 RSSI measurement accuracy on SCC with CCA

A.10.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

A.10.5.5.2.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, Cell 3 is SCell on a carrier frequency under CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.10.5.5.2.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.10.5.5.2.2-2 and A.10.5.5.2.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.5.2.2-1: RSSI supported test configurations

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.5.5.2.2-2: RSSI test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 2	Cell 3
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA	CCR.1.1 CCA
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.10.5.5.2.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.10.5.5.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.10.5.5.3 Inter-frequency RSSI measurement accuracy on a carrier with CCA

A.10.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.2.

A.10.5.5.3.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, and Cell 3 is the neighbour with CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.10.5.5.3.2-1. The accuracy of RSSI inter-frequency measurements is tested by using the parameters in A.10.5.5.3.2-2 and A.10.5.5.3.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.5.3.2-1: RSSI supported test configurations

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.5.5.3.2-2: RSSI test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 2	Cell 3
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 TDD	NA
RMSI CORESET Reference Channel				CR.1.1 TDD	NA
Dedicated CORESET Reference Channel				CCR.1.1 TDD	NA
OCNG Patterns				OP.1	NA
EPRE ratio of PSS to SSS			dB	0	NA
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.10.5.5.3.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.10.5.5.3.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.2. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.10.5.6 Channel occupancy

A.10.5.6.1 Channel occupancy measurement accuracy on PSCC with CCA

A.10.5.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

A.10.5.6.1.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, and Cell 2 is PSCell operating on a carrier frequency under CCA. Channel occupancy is measured on channel number 1. Supported test configurations are shown in table A.10.5.6.1.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.10.5.6.1.2-2 and A.10.5.6.1.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.6.1.2-1: CO supported test configurations

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.5.6.1.2-2: CO test parameters

Parameter		Configurations	Unit	Test 1
				Cell 2
RF Channel Number				1
$BW_{channel}$			MHz	40
SSB configuration	Semi-static channel access Note 1, 3	1,2		SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2		SSB.2 CCA
P_{CCA_DL}				TBD
P_{CCA_UL}				TBD
DL CCA model				As specifieed in A.3.20.2.1
UL CCA model				As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth
Channel access bandwidth			MHz	20
DRX Cycle configuration			ms	Not Applicable
PDSCH Reference measurement channel				SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA
OCNG Patterns				OP.1
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	-Infinity
SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)				-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-87
Propagation condition			-	AWGN
channelOccupancyThreshold			dBm	-83
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel				

occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.10.5.6.1.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.10.5.6.1.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.10.5.6.2 Channel occupancy measurement accuracy on SCC with CCA

A.10.5.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

A.10.5.6.2.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, Cell 3 is SCell on a carrier frequency under CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.10.5.6.2.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.10.5.6.2.2-2 and A.10.5.6.2.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.6.2.2-1: CO supported test configurations

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.5.6.2.2-2: CO test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 2	Cell 3
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA	CCR.1.1 CCA
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
channelOccupancyThreshold		dBm	-83	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.10.5.6.2.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.10.5.6.2.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.10.5.6.3 Inter-frequency channel occupancy measurement accuracy on a carrier with CCA

A.10.5.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.2.

A.10.5.6.3.2 Test parameters

In all test cases, Cell 1 is E-UTRAN PCell on a licensed band, Cell 2 is PSCell operating on a carrier frequency under CCA, and Cell 3 is the neighbour with CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.10.5.6.3.2-1. The accuracy of channel occupancy inter-frequency measurements is tested by using the parameters in A.10.5.6.3.2-2 and A.10.5.6.3.2-3. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.10.5.6.3.2-1: CO supported test configurations

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.10.5.5.3.2-2: CO test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 2	Cell 3
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 TDD	NA
RMSI CORESET Reference Channel				CR.1.1 TDD	NA
Dedicated CORESET Reference Channel				CCR.1.1 TDD	NA
OCNG Patterns				OP.1	NA
EPRE ratio of PSS to SSS			dB	0	NA
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
channelOccupancyThreshold		dBm	-83	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.10.5.6.3.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.10.5.6.3.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.11 NR Standalone Tests with NR PCell under CCA and Other NR Cells in FR1

Editor's note: Test cases for NR SA with NR PCell under CCA and SCell under CCA are also included here.

A.11.1 RRC_IDLE state mobility

A.11.1.1 Cell re-selection with both source and target NR carrier frequencies under CCA

A.11.1.1.1 Cell reselection to FR1 intra-frequency NR cells when subject to CCA on the serving and target cell

A.11.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements subject to CCA specified in clause 4.2A.2.3. Supported test configurations are shown in table A. 11.1.1.1.2-1.

A.11.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier that is subject to CCA and 2 cells as given in tables A.11.1.1.1.2-1, A.11.1.1.1.2-2 and A.11.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.11.1.1.1.2-1: Supported test configurations

Configuration	Description
1	With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case when subject to CCA

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1	Cell1	
	Neighbour cells		1	Cell2	
T2 end condition	Active cell		1	Cell2	
	Neighbour cells		1	Cell1	
Final condition	Active cell		1	Cell1	
RF Channel Number			1	1	
Time offset between cells			1	3 μs	Synchronous cells
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB configuration	Semi-static channel access		1	SSB.1 CCA	(As defined in A.3.10A)
	Dynamic channel access			SSB.2 CCA	
DBT Window Configuration			1	DBT.1	As specified in clause A.3.28.1.
SMTC confituration				SMTC.1	
DL CCA model			1	As specified in clause A.3.26.2.1	
UL CCA model			1	As specified in clause A.3.26.2.2	
DRX cycle length		s	1	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1	Not configured	
T1		s	1	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		s	1	40	T2 needs to be defined so that cell re-selection reaction time is taken into account.
T3		s	1	15	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.11.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN when subject to CCA

Parameter	Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 1 T3	Cell 2 T1	Cell 2 T2	Cell 2 T3
TDD configuration		1	TDDConf.1.1 CCA			TDDConf.1.1 CCA		
DL CCA probability for semi-static channel access (P_{CCA_DL})		1	0.9			0.9		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1	0.75			0.75		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		1	0.5			0.5		
UL CCA probability P_{CCA_UL}		1	1			1		
$M_{d,max}$		1	16			16		
$M_{m,max}$		1	4			4		
$M_{e,max}$		1	8			8		
PDSCH RMC		1	SR.1.1 CCA			SR.1.1 CCA		
RMSI CORESET		1	CR.1.1 CCA			CR.1.1 CCA		
Dedicated CORESET		1	CCR.1.1 CCA			CCR.1.1 CCA		
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1	SSB			SSB		
Qrxlevmin	dBm/SCS	1	-127			-127		
Pcompensation	dB	1	0			0		
$Qhyst_s$	dB	1	0			0		
$Qoffset_{s,n}$	dB	1	0			0		
Cell_selection_and_ reselection_quality_measurement		1	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
N_{oc} Note2	dBm/SCS	1	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
$\hat{E}_s/N_{oc}$	dB	1	16	13	16	-infinity	16	13
SS-RSRP Note3	dBm/SCS	1	-79	-82	-79	-infinity	-79	-82
Io	dBm/38.16 MHz	1	-47.85	-46.12	-46.12	Same as parameters specified in Cell 1 columns-		
Treselection	s	1	0	0	0	0	0	0
SintrasearchP	dB	1	50			50		
Propagation Condition		1	AWGN					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.11.1.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than $(25 + M_d)*1.28 + T_{SI\_CCA}$ s. M_d is the number of DRX cycles with at least one SMTC where there are no SSBs available during the T_{detect,NR_Intra_CCA}. If $M_d > M_{d,max}$ the UE is required to restart the detection of Cell 2.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than $(5+M_e)*1.28 + T_{SI\_CCA}$ s. M_e is the number of DRX cycles with at least one SMTC where there are no SSBs available during the $T_{evaluate,NR\_Intra\_CCA}$. If $M_e > M_{e,max}$ the UE is required to restart the evaluation of Cell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect, NR\_Intra\_CCA} + T_{SI\_CCA}$, and to an already detected cell can be expressed as: $T_{evaluate, NR\_ intra\_CCA} + T_{SI\_CCA}$,

Where:

- T_{detect, NR_Intra_CCA} See Table 4.2A.2.3-1 in clause 4.2A.2.3
- $T_{evaluate, NR\_ intra\_CCA}$ See Table 4.2A.2.3-1 in clause 4.2A.2.3
- T_{SI_CCA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

This gives a total of $(25 + M_d)*1.28 + T_{SI\_CCA}$ s for the cell re-selection delay to a newly detectable cell and $(5+M_e)*1.28 + T_{SI\_CCA}$ s for the cell re-selection delay to an already detected cell in the test case.

A.11.1.1.2 Cell reselection to FR1 inter-frequency NR case when subject to CCA on the serving and target cell

A.11.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements subject to CCA specified in clause 4.2A.2.4. Supported test configurations are shown in table A.11.1.1.2.2-1.

A.11.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers that are subject to CCA respectively as given in tables A.11.1.1.2.2-1, A.11.1.1.2.2-2 and A.11.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.11.1.1.2.2-1: Supported test configurations

Configuration	Description of cell 1 with CCA	Description of cell 2 with CCA
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when subject to CCA

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1	Cell2	The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1
T1 end condition	Active cell		1	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1	Cell2	
T3 end condition	Active cell		1	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
RF Channel Number			1	1, 2	
Time offset between cells			1	3 μs	Synchronous cells
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB configuration	Semi-static channel access		1	SSB.1 CCA (As defined in A.3.10A)	
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)	
DBT Window Configuration			1	DBT.1	As specified in clause A.3.28.1.
SMTC configuration			1	SMTC.1	
DL CCA model			1	As specified in clause A.3.26.2.1	
UL CCA model			1	As specified in clause A.3.26.2.2	
DRX cycle length		s	1	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1	Not configured	
T1		s	1	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3		s	1	75	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.11.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1	TDDConf.1.1 CCA			TDDConf.1.1 CCA		
DL CCA probability for semi-static channel access (P_{CCA_DL})		1	0.9			0.9		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1	0.75			0.75		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		2	0.5			0.5		
UL CCA probability P_{CCA_UL}		1	1			1		
$M_{d,max}$		1	16			16		
$M_{m,max}$		1	4			4		
$M_{e,max}$		1	8			8		
PDSCH RMC		1	SR.1.1 CCA			SR.1.1 CCA		
RMSI CORESET		1	CR.1.1 CCA			CR.1.1 CCA		
Dedicated CORESET		1	CCR.1.1 CCA			CCR.1.1 CCA		
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1	SSB			SSB		
Qrxlevmin	dBm/SCS	1	-137			-137		
Pcompensation	dB	1	0			0		
$Qhyst_s$	dB	1	0			0		
$Qoffset_{s, n}$	dB	1	0			0		
Cell_selection_and_reselection_quality_measurement		1	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	14	14	14	-4	-infinity	12
N_{oc} Note2	dBm/SCS	1	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
$\hat{E}_s/N_{oc}$	dB	1	14	14	14	-4	-infinity	12
SS-RSRP Note3	dBm/SCS	1	-81	-81	-81	-99	-infinity	-83
Io	dBm/38.16 MHz	1	-49.79	-49.79	-49.79	-62.50	-infinity	-51.69
Treselection	s	1	0	0	0	0	0	0
SnonintrasearchP	dB	1	50			50		
$Thresh_{x, high}$	dB	1	48			48		
$Thresh_{serving, low}$	dB	1	44			44		
$Thresh_{x, low}$	dB	1	50			50		

Propagation Condition		1	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.			

A.11.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 60 + 1.28 x (5 + M_e) + T_{SI_CCA} s. M_e is the number of DRX cycles with at least one SMTC where there are no SSBs available during the $T_{evaluate,NR\_Intra\_CCA}$. If $M_e > M_{e,max}$ the UE is required to restart the evaluation of cell 2.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 1.28 x (5 + M_e) + T_{SI_CCA} s. M_e is the number of DRX cycles with at least one SMTC where there are no SSBs available during the $T_{evaluate,NR\_Intra\_CCA}$. If $M_e > M_{e,max}$ the UE is required to restart the evaluation of cell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search}$ + $T_{evaluate,\ NR\_\ inter\_CCA}$ + T_{SI_CCA}, and to a lower priority cell can be expressed as: $T_{evaluate,\ NR\_\ inter\_CCA}$ + T_{SI_CCA},

Where:

- $T_{higher\_priority\_search}$ See clause 4.2.2.7
- $T_{evaluate,\ NR\_\ inter\_CCA}$ See Table 4.2A.2.4-1 in clause 4.2A.2.4
- T_{SI_CCA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

This gives a total of 60 + 1.28 x (5 + M_e) + T_{SI_CCA} s for the cell re-selection delay to a higher priority cell and 1.28 x (5 + M_e) + T_{SI_CCA} s for the cell re-selection delay to a lower priority cell in the test case.

A.11.1.2 Cell re-selection to NR with source NR carrier frequency under CCA

A.11.1.2.1 Cell reselection to FR1 inter-frequency NR case when serving cell is subject to CCA

A.11.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4 when the serving cell is subject to CCA. Supported test configurations are shown in table A.11.1.2.1.2-1.

A.11.1.2.1.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers where the first carrier is subject to CCA as given in tables A.11.1.2.1.2-1, A.11.1.2.1.2-2 and A.11.1.2.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.11.1.2.1.2-1: Supported test configurations

Configuration	Description of a cell with CCA	Description of a cell without CCA
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.11.1.2.1.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when serving cell is subject to CCA

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 which is subject to CCA in the initial phase and during T1 period the UE reselects to cell 1 which is an inter-frequency NR cell
T1 end condition	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1, 2, 3	Cell2	
T3 end condition	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
RF Channel Number			1, 2, 3	1, 2	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	Cell 1: SSB.1 FR1 Cell 2: SSB.1 CCA for semi-static channel access; Cell 2: SSB.2 CCA for dynamic channel access	
			2	Cell 1: SSB.1 FR1 Cell 2: SSB.1 CCA for semi-static channel access; Cell 2: SSB.2 CCA for dynamic channel access	
			3	Cell 1: SSB.2 FR1 Cell 2: SSB.1 CCA for semi-static channel access; Cell 2: SSB.2 CCA for dynamic channel access	
SMTC configuration			1	Cell 1: SMTC pattern 2 Cell 2: N/A	
			2	Cell 1: SMTC pattern 1 Cell 2: N/A	
			3	Cell 1: SMTC pattern 1 Cell 2: N/A	
DBT Window Configuration			1, 2, 3	Cell 1: N/A Cell 2: DBT.1	As specified in clause A.3.28.1.
DL CCA model			1, 2, 3	Cell 1: N/A Cell 2: As specified in clause A.3.26.2.1	
UL CCA model			1, 2, 3	Cell 1: N/A Cell 2: As specified in clause A.3.26.2.2	
DRX cycle length		s	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		s	1, 2, 3	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.

T2	s	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3	s	1, 2, 3	75	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.11.1.2.1.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN when serving cell is subject to CCA

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1	N/A			TDDConf.1.1.CCA		
		2	TDDConf.1.1			TDDConf.1.1.CCA		
		3	TDDConf.2.1			TDDConf.1.1.CCA		
DL CCA probability for semi-static channel access (P_{CCA_DL})		1, 2, 3	N/A			0.9		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1, 2, 3	N/A			0.75		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		1, 2, 3	N/A			0.5		
UL CCA probability P_{CCA_UL}		1, 2, 3	N/A			1		
$M_{d,max}$		1, 2, 3	N/A			16		
$M_{m,max}$		1, 2, 3	N/A			4		
$M_{e,max}$		1, 2, 3	N/A			8		
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 CCA		
		2	SR.1.1 TDD			SR.1.1 CCA		
		3	SR.2.1 TDD			SR.1.1 CCA		
RMSI CORESET RMC configuration		1	CR.1.1 FDD			CR.1.1 CCA		
		2	CR.1.1 TDD			CR.1.1 CCA		
		3	CR.2.1 TDD			CR.1.1 CCA		
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD			CCR.1.1 CCA		
		2	CCR.1.1 TDD			CCR.1.1 CCA		
		3	CCR.2.1 TDD			CCR.1.1 CCA		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2, 3	SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2	-140			-137		
		3	-137			-137		
Pcompensation	dB	1, 2, 3	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	14	14	14	-4	-infinity	12
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-98			-95		
		2	-98			-95		
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	14	14	14	-4	-infinity	12
		2						

		3						
SS-RSRP Note3	dBm/SCS	1	-84	-84	-84	-102	-infinity	-83
		2	-84	-84	-84	-102	-infinity	-83
		3	-81	-81	-81	-99	-infinity	-83
Io	dBm/9.36 MHz	1	-55.88	-55.88	-55.88	-68.60	--	--
	dBm/9.36 MHz	2	-55.88	-55.88	-55.88	-68.60	--	--
	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50	-63.96	-51.69
Treselection	s	1, 2, 3	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2, 3	50			50		
$Thresh_{x, highP}$	dB	1, 2, 3	48			48		
$Thresh_{serving, lowP}$	dB	1, 2, 3	44			44		
$Thresh_{x, lowP}$	dB	1, 2, 3	50			50		
Propagation Condition		1, 2, 3	AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.								

A.11.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than $60 + 1.28 \times (5 + M_e) + T_{SI\_CCA}$ s. M_e is the number of DRX cycles with at least one SMTC where there are no SSBs available during the $T_{evaluate,NR\_Intra\_CCA}$. If $M_e > M_{e,max}$ the UE is required to restart the evaluation of cell 2.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search} + T_{evaluate, NR\_ inter\_CCA} + T_{SI\_CCA}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$.

Where:

- $T_{higher\_priority\_search}$ See clause 4.2.2.7
- $T_{evaluate, NR\_ inter\_CCA}$ See Table 4.2A.2.4-1 in clause 4.2A.2.4
- T_{SI_CCA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.
- $T_{evaluate, NR\_ inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4
- T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test cases.

This gives a total of 60 + 1.28 x (5 + M_e) + T_{SI_CCA} s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.11.1.3 Cell re-selection from NR carrier with target NR carrier frequency under CCA

A.11.1.3.1 Cell reselection to FR1 inter-frequency NR case when target cell is subject to CCA

A.11.1.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2A.2.4 when the target cell is subject to CCA. Supported test configurations are shown in table A. 11.1.3.1.2-1.

A.11.1.3.1.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers where the second carrier is subject to CCA as given in tables A.11.1.3.1.2-1, A.11.1.3.1.2-2 and A.11.1.3.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.11.1.3.1.2-1: Supported test configurations

Configuration	Description of a cell without CCA	Description of a cell with CCA
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.		

Table A.11.1.3.1.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case when target cell is subject to CCA

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 which is an inter-frequency NR cell in the initial phase and during T1 period the UE reselects to cell 1 which is cell subject to CCA
	Neighbour cell		1, 2, 3	Cell 1	
T1 end condition	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1 during T1
	Neighbour cells		1, 2, 3	Cell2	
T3 end condition	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
	Neighbour cell		1, 2, 3	Cell 1	
RF Channel Number			1, 2, 3	1, 2	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	Cell 1: SSB.1 CCA for semi-static channel access; Cell 1: SSB.2 CCA for dynamic channel access; Cell 2: SSB.1 FR1	
			2	Cell 1: SSB.1 CCA for semi-static channel access; Cell 1: SSB.2 CCA for dynamic channel access; Cell 2: SSB.1 FR1	
			3	Cell 1: SSB.1 CCA for semi-static channel access; Cell 1: SSB.2 CCA for dynamic channel access; Cell 2: SSB.2 FR1	
SMTC configuration			1	Cell 1: SMTC.1 Cell 2: SMTC.2	
			2	Cell 1: SMTC.1 Cell 2: SMTC.1	
			3	Cell 1: SMTC.1 Cell 2: SMTC.1	
DBT Window Configuration			1, 2, 3	Cell 1: DBT.1 Cell 2: N/A	As specified in clause A.3.28.1.
DL CCA model			1, 2, 3	Cell 1: As specified in clause A.3.26.2.1 Cell 2: N/A	

UL CCA model		1, 2, 3	Cell 1: As specified in clause A.3.26.2.2 Cell 2: N/A	
DRX cycle length	s	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell		1, 2, 3	Not configured	
T1	s	1, 2, 3	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2	s	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3	s	1, 2, 3	75	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.11.1.3.1.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN when target cell is subject to CCA

Parameter	Unit	Test configuration	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
TDD configuration		1	TDDConf.1.1.CCA			N/A		
		2	TDDConf.1.1.CCA			TDDConf.1.1		
		3	TDDConf.1.1.CCA			TDDConf.2.1		
DL CCA probability for semi-static channel access (P_{CCA_DL})		1, 2, 3	0.9			N/A		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1, 2, 3	0.75			N/A		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		1, 2, 3	0.5			N/A		
UL CCA probability P_{CCA_UL}		1, 2, 3	1			N/A		
$M_{d,max}$		1, 2, 3	16			N/A		
$M_{m,max}$		1, 2, 3	4			N/A		
$M_{e,max}$		1, 2, 3	8			N/A		
PDSCH RMC configuration		1	SR.1.1 CCA			SR.1.1 FDD		
		2	SR.1.1 CCA			SR.1.1 TDD		
		3	SR.1.1 CCA			SR.2.1 TDD		
RMSI CORESET RMC configuration		1	CR.1.1 CCA			CR.1.1 FDD		
		2	CR.1.1 CCA			CR.1.1 TDD		
		3	CR.1.1 CCA			CR.2.1 TDD		
Dedicated CORESET RMC configuration		1	CCR.1.1 CCA			CCR.1.1 FDD		
		2	CCR.1.1 CCA			CCR.1.1 TDD		
		3	CCR.1.1 CCA			CCR.2.1 TDD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
RLM-RS		1, 2, 3	SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2	-137			-140		
		3	-137			-137		
Pcompensation	dB	1, 2, 3	0			0		
Cell_selection_and_reselection_quality_measurement		1, 2, 3	SS-RSRP			SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1	14	14	14	-4	-infinity	12
		2						
		3						
N_{oc} Note2	dBm/SCS	1	-95			-98		
		2	-95			-98		
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	14	14	14	-4	-infinity	12
		2						

		3						
SS-RSRP Note3	dBm/SCS	1	-81	-81	-81	-102	-infinity	-86
		2	-81	-81	-81	-102	-infinity	-86
		3	-81	-81	-81	-99	-infinity	-83
Io	dBm/9.36 MHz	1	--	--	--	-68.60	-70.05	-57.78
	dBm/9.36 MHz	2	--	--	--	-68.60	-70.05	-57.78
	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50	-63.96	-51.69
Treselection	s	1, 2, 3	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2, 3	50			50		
$Thresh_{x, highP}$	dB	1, 2, 3	48			48		
$Thresh_{serving, lowP}$	dB	1, 2, 3	44			44		
$Thresh_{x, lowP}$	dB	1, 2, 3	50			50		
Propagation Condition		1, 2, 3	AWGN					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.11.1.3.1.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

1.28 x (5 + M_e) + T_{SI_CCA} s. Me is the number of DRX cycles with at least one SMTC where there are no SSBs available during the $T_{evaluate,NR\_Intra\_CCA}$. If $M_e > M_{e,max}$ the UE is required to restart the evaluation of cell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search} + T_{evaluate, NR\_ inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR\_ inter} + T_{SI-NR}$.

Where:

- $T_{higher\_priority\_search}$ See clause 4.2.2.7
- $T_{evaluate, NR\_ inter\_CCA}$ See Table 4.2A.2.4-1 in clause 4.2A.2.4
- T_{SI_CCA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.
- $T_{evaluate, NR\_ inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4
- T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 1.28 x (5 + M_e) + T_{SI_CCA} s for the cell re-selection delay to a lower priority cell in the test case.

A.11.1.4 Inter-RAT cell re-selection to E-UTRAN with source NR carrier frequency under CCA

A.11.1.4.1 Cell reselection to higher priority E-UTRAN when serving cell is subject to CCA

A.11.1.4.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR cell subject to CCA to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2A.2.5 when the E-UTRAN cell is of higher priority.

A.11.1.4.1.2 Test Parameters

The test scenario comprises of one NR cell which is subject to CCA and one E-UTRAN cell as given in tables A.11.1.4.1.2-1, A.11.1.4.1.2-2, A.11.1.4.1.2-3 and A.11.1.4.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.11.1.4.1.2-1: Supported test configurations

Configuration	Description of a cell with CCA	Description of a cell without CCA
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.11.1.4.1.2-2: General test parameters for NR cell subject to CCA to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2.
T2 end condition	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2 during T2.
	Neighbour cells		1, 2	Cell1	
T3 end condition	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1 during T3 for iteration of the tests.
	Neighbour cells		1, 2	Cell2	
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC configuration			1, 2	SMTC.1	
DBT Window Configuration			1, 2	DBT.1	As specified in clause A.3.28.1.
SSB configuration				Cell 1: SSB.1 CCA for semi-static channel access; Cell 1: SSB.2 CCA for dynamic channel access;	
DL CCA model			1, 2	As specified in clauseA.3.26.2.1	
UL CCA model			1, 2	As specified in clause A.3.26.2.2	
DRX cycle length		s	1, 2	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			2	4	
E-UTRAN PRACH configuration index			1	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			2	4	
T1		s	1, 2	>7	During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2.
T2		s	1, 2	75	T2 needs to be defined so that cell re-selection reaction time is taken into account.
T3		s	1, 2	15	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.11.1.4.1.2-3: Cell specific test parameters for NR cell 1 subject to CCA

Parameter	Unit	Test configuration	Cell 1		
			T1	T2	T3
TDD configuration		1, 2	TDDConf.1.1.CCA		
DL CCA probability for semi-static channel access (P_{CCA_DL})		1, 2	0.9		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1, 2	0.75		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		1, 2	0.5		
UL CCA probability P_{CCA_UL}		1, 2	1		
$M_{d,max}$		1, 2	16		
$M_{m,max}$		1, 2	4		
$M_{e,max}$		1, 2	8		
PDSCH parameters		1, 2	SR.1.1 CCA		
RMSI CORESET parameters		1, 2	CR.1.1 CCA		
Dedicated CORESET parameters		1, 2	CCR.1.1 CCA		
SSB parameters		1, 2	SSB.1 CCA for semi-static channel access; SSB.2 CCA for dynamic channel access		
NR SMTC parameters		1, 2	SMTC.1		
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1, 2	DLBWP.0		
Initial UL BWP configuration		1, 2	ULBWP.0		
RLM-RS		1, 2	SSB		
Qrxlevmin	dBm/SCS	1, 2	-137		
N_{oc}	dBm/SCS	1, 2	-95		
N_{oc}	dBm/15 kHz	1, 2	-98		
SS-RSRP		1, 2	-81	-81	-81
$\hat{E}_s/I_{ot}$	dB	1, 2	14	14	14
$\hat{E}_s/N_{oc}$	dB	1, 2	14	14	14
Io	dBm/38.16 MHz	1, 2	-49.79	-49.79	-49.79
Treselection	S	1, 2	0		
Snonintrasearch	dB	1, 2	50		
$Thresh_{x,\ high\ (Note\ 2)}$	dB	1, 2	48		
$Thresh_{serving,\ low}$	dB	1, 2	44		
$Thresh_{x,\ low}$	dB	1, 2	50		
Propagation Condition		1, 2	AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: This refers to the value of $Thresh_{x,\ high}$ which is included in NR system information, and is a threshold for the E-UTRA target cell
Note 3: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.11.1.4.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2		
		T1	T2	T3
E-UTRA RF Channel number		1		
$BW_{channel}$	MHz	10		
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6		
PBCH_RA	dB	0		
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB			
PHICH_RB	dB			
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA[Note 1]	dB			
OCNG_RB[Note 1]	dB			
Qrxlevmin	dBm	-140		
N_{oc}	dBm/15 kHz	-98		
RSRP	dBm/15 KHz	-infinity	-86	-102
$\hat{E}_s/I_{ot}$	dB	-infinity	12	-4
$\hat{E}_s/N_{oc}$	dB	-infinity	12	-4
$Treselection_{EUTRAN}$	S	0		
Snonintrasearch	dB	50		
$Thresh_{x,\ high\ (Note\ 2)}$	dB	48		
$Thresh_{serving,\ low}$	dB	44		
$Thresh_{x,\ low}$	dB	50		
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x,\ high}$ which is included in E-UTRA system information, and is a threshold for the NR target cell				

A.11.1.4.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search} + T_{evaluate,\ E-UTRAN} + T_{SI-E-UTRA}$,

Where:

- $T_{higher\_priority\_search}$ See clause 4.2.2.7

- $T_{evaluate, E-UTRAN}$ See Table 4.2.2.5-1 in clause 4.2.2.5
- $T_{SI-E-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.11.1.4.2 Cell reselection to lower priority E-UTRAN when serving cell is subject to CCA

A.11.1.4.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR cell subject to CCA to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2A.2.5 when the E-UTRAN cell is of lower priority.

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.11.1.4.2.1-1, A.11.1.4.2.1-2, A.11.1.4.2.1-3 and A.11.1.4.2.1-4. The test consists of three successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.11.1.4.2.1-1: Supported test configurations

Configuration	Description of a cell with CCA	Description of a cell without CCA
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.11.1.4.2.1-2: General test parameters for NR cell subject to CCA to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	The UE camps on cell 1 in the initial phase.
T1 end condition	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2 during T1.
	Neighbour cells		1, 2	Cell1	
T2 end condition	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1 during T2 for iteration of the tests.
	Neighbour cells		1, 2	Cell2	
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC configuration			1, 2	SMTC.1	
DBT Window Configuration			1, 2	DBT.1	As specified in clause A.3.28.1.
DL CCA model			1, 2	As specified in clause A.3.26.2.1	
UL CCA model			1, 2	As specified in clause A.3.26.2.2	
DRX cycle length		s	1, 2	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index			1	53	As specified in table 5.7.1-2 in TS 36.211 [23]
			2	4	
T1		s	1, 2	15	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2	75	T2 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.11.1.4.2.1-3: Cell specific test parameters for NR cell 1 subject to CCA

Parameter	Unit	Test configuration	Cell 1	
			T1	T2
TDD configuration		1, 2	TDDConf.1.1.CCA	
DL CCA probability for semi-static channel access (P_{CCA_DL})		1, 2	0.9	
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1, 2	0.75	
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		1, 2	0.5	
UL CCA probability P_{CCA_UL}		1, 2	1	
$M_{d,max}$		1, 2	16	
$M_{m,max}$		1, 2	4	
$M_{e,max}$		1, 2	8	
PDSCH RMC configuration		1, 2	SR.1.1 CCA	
RMSI CORESET RMC Configuration		1, 2	CR.1.1 CCA	
Dedicated CORESET RMC Configuration		1, 2	CCR.1.1 CCA	
SSB configuration		1, 2	SSB.1 CCA for semi-static channel access; SSB.2 CCA for dynamic channel access	
SMTC configuration		1, 2	SMTC.1	
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1	
Initial DL BWP configuration		1, 2	DLBWP.0	
Initial UL BWP configuration		1, 2	ULBWP.0	
RLM-RS		1, 2	SSB	
Qrxlevmin	dBm/SCS	1, 2	-137	
N_{oc}	dBm/SCS	1, 2	-95	
N_{oc}	dBm/15 kHz	1, 2	-98	
SS-RSRP	dBm/SCS	1, 2	-99	-83
$\hat{E}_s/I_{ot}$	dB	1, 2	-4	12
$\hat{E}_s/N_{oc}$	dB	1, 2	-4	12
Io	dBm/38.16 MHz	1, 2	-62.50	-51.69
Treselection	S	1, 2	0	
Snonintrasearch	dB	1, 2	50	
$Thresh_{x,\ high\ (Note\ 2)}$	dB	1, 2	48	
$Thresh_{serving,\ low}$	dB	1, 2	44	
$Thresh_{x,\ low}$	dB	1, 2	50	
Propagation Condition		1, 2	AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: This refers to the value of $Thresh_{x,\ high}$ which is included in NR system information, and is a threshold for the E-UTRA target cell
Note 3: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.11.1.4.2.1-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2	
		T1	T2
E-UTRA RF Channel number		1	
$BW_{channel}$	MHz	10	
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6	
PBCH_RA	dB	0	
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA[Note 1]	dB		
OCNG_RB[Note 1]	dB		
Qrxlevmin	dBm	-140	
N_{oc}	dBm/15 kHz	-98	
RSRP	dBm/15 KHz	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14
$\hat{E}_s/N_{oc}$	dB	14	14
$Treselection_{EUTRAN}$	S	0	
Snonintrasearch	dB	50	
$Thresh_{x, high (Note 2)}$	dB	48	
$Thresh_{serving, low}$	dB	44	
$Thresh_{x, low}$	dB	50	
Propagation Condition		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: This refers to the value of $Thresh_{x, high}$ which is included in E-UTRA system information, and is a threshold for the NR target cell			

A.11.1.4.2.2 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

- $T_{evaluate, E-UTRAN}$ See Table 4.2.2.5-1 in clause 4.2.2.5

- $T_{SI-E-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.11.2 RRC_CONNECTED state mobility

A.11.2.1 Handover

A.11.2.1.1 Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; known target cell

A.11.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR intra frequency handover requirements from FR1 carrier under CCA to FR1 carrier under CCA specified in clause 6.1B.1.2.

A.11.2.1.1.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.1.2-2, and A.11.2.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.11.2.1.1.2-1: Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA test configurations

Config	Description
1	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.1.1.2-2: General test parameters Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	On the carrier under CCA
	Neighbouring cell		Cell 2	On the carrier under CCA
Final condition	Active cell		Cell 2	On the carrier under CCA
DL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.20.2.1	
	Semi-static channel access Note 2, 3			
UL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.20.2.2	
	Semi-static channel access Note 2,3			
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T304		ms	500	
L_{CCA_DL}			5	
W_{CCA_DL}		ms	T304	
L_{CCA_UL}			5	
W_{CCA_UL}		ms	T304	
T1		s	5	
T2		s	$\leq$ 5	
T3		s	$\geq T_{interrupt}$	$T_{interrupt}$ is defined in clause 6.1B.1.2
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.1.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3

NR RF Channel Number			1			1		
P_{CCA_DL} for dynamic channel access Note 4,6		-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75			$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		
P_{CCA_DL} for semi-static channel access Note 5,6		-	P_{CCA_DL}=0.9375			P_{CCA_DL}=0.9375		
P_{CCA_UL} for dynamic channel access Note 4,6		-	0.75			0.75		
P_{CCA_UL} for semi-static channel access Note 5,6		-	0.87			0.87		
TDD configuration	Config 1		TDDConf.1.1 CCA					
$BW_{channel}$	Config 1		40: $N_{RB,c}$ = 106					
BWP BW	Config 1		40: $N_{RB,c}$ = 106					
DRX Cycle		ms	Not Applicable					
PDSCH Reference	Config 1		SR.1.1 CCA					
CORESET Reference Channel	Config 1		CR.1.1 CCA					
Dedicated CORESET RMC configuration	Config 1		CCR.1.1 CCA					
TRS configuration	Config 1		TRS.1.1 TDD					
OCNG Patterns			OP.1					
SMTC Configuration			SMTC.1					
DBT window configuration	Config 1		DBT.1					
SSB configuration for semi-static channel access Note 4, 6	Config 1		SSB.1 CCA					
SSB configuration for dynamic channel access Note 5, 6	Config 1		SSB.2 CCA					
ssb-PositionQCL	Config 1		[1]					
PDSCH/PDCCH subcarrier spacing	Config 1	kHz	30 kHz					
PUCCH/PUSCH subcarrier spacing	Config 1	kHz	30 kHz					
PRACH configuration			FR1 PRACH configuration 1 under CCA					
BWP configuration	Initial DL BWP		DLBWP.0.1					
	Dedicated DL BWP		DLBWP.1.1					
	Initial UL BWP		ULBWP.0.1					
	Dedicated UL BWP		ULBWP.1.1					
EPRE ratio of PSS to SSS		dB	0					
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
N_{oc} Note2		dBm/15kHz	-98					
N_{oc} Note2	Config 1	dBm/SCS	-95					
$\hat{E}_s/I_{ot}$		dB	8	-3.3	-3.3	-Infinity	2.36	2.36
$\hat{E}_s/N_{oc}$		dB	8	8	8	-Infinity	11	11
SSB_RP	Config 1	dBm/SCS	-87	-87	-87	-Infinity	-84	-84
Io Note3	Config 1	dBm/	-55.31	-50.96	-50.96	-55.31	-50.96	-50.96

		38.16MHz						
Propagation condition		-	AWGN			AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.11.2.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $T_{interrupt}$ from the beginning of time period T3, where $T_{interrupt}$ is defined in clause 6.1B.1.2
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$

$T_{search} = 0$.

$T_{processing} = 20$ ms.

$T_{margin} = 2$ ms.

$T_{\Delta} = (1+ L_2) *20$ ms.

$T_{IU} = (1+ L_3)*10 + 10$ ms

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L_2 is the number of SMTC occasions not available at the UE during the time tracking period where $L_2 \leq L_{CCA\_DL}$, and L_3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure, where $L_3 \leq L_{CCA\_UL}$. $L_3 = 0$ for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by L_1, L_2 , L_3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer. The UE behaviour at the T304 timer expiry is detailed in TS 38.331 [2]. Test equipment should make sure that L_{CCA_DL} and L_{CCA_UL} are not exceeded during a test by monitoring the number of CCA failures and preventing additional CCA failures from happening after L_{CCA_DL} or L_{CCA_UL} is reached.

A.11.2.1.2 Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; unknown target cell

A.11.2.1.2.1 Test Purpose and Environment

This test is to verify the requirement intra frequency handover requirements from FR1 carrier under CCA to FR1 carrier under CCA specified in clause 6.1B.1.2.

A.11.2.1.2.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.2.2-2, and A.11.2.1.2.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.2.2-1: Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA test configurations

Config	Description
1	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.1.2.2-2: General test parameters Intra-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	On the carrier under CCA
	Neighbouring cell		Cell 2	On the carrier under CCA
Final condition	Active cell		Cell 2	On the carrier under CCA
DL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.20.2.1	
	Semi-static channel access Note 2, 3			
UL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.20.2.2	
	Semi-static channel access Note 2,3			
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T304		ms	500	
L_{CCA_DL}			5	
W_{CCA_DL}		ms	T304	
L_{CCA_UL}			5	
W_{CCA_UL}		ms	T304	
T1		s	5	
T2		s	$\geq T_{interrupt}$	$T_{interrupt}$ is defined in clause 6.1B.1.2
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
		T1	T2	T1	T2

NR RF Channel Number			1		1	
P_{CCA_DL} for dynamic channel access Note 4,6		-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 5,6		-	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 4,6		-	0.75		0.75	
P_{CCA_UL} for semi-static channel access Note 5,6		-	0.87		0.87	
TDD configuration	Config 1		TDDConf.1.1 CCA			
$BW_{channel}$	Config 1		40: $N_{RB,c}$ = 106			
BWP BW	Config 1		40: $N_{RB,c}$ = 106			
DRX Cycle		ms	Not Applicable			
PDSCH Reference	Config 1		SR.1.1 CCA			
CORESET Reference Channel	Config 1		CR.1.1 CCA			
Dedicated CORESET RMC configuration	Config 1		CCR.1.1 CCA			
TRS configuration	Config 1		TRS.1.2 TDD			
OCNG Patterns			OP.1			
SMTC Configuration			SMTC.1			
DBT window configuration	Config 1		DBT.1			
SSB configuration for semi-static channel access Note 4, 6	Config 1		SSB.1 CCA			
SSB configuration for dynamic channel access Note 5, 6	Config 1		SSB.2 CCA			
ssb-PositionQCL	Config 1		[1]			
PDSCH/PDCCH subcarrier spacing	Config 1	kHz	30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1	kHz	30 kHz			
PRACH configuration			FR1 PRACH configuration 1 under CCA			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			
N_{oc} Note2	Config 1	dBm/SCS	-95			
$\hat{E}_s/I_{ot}$		dB	8	-0.64	-Infinity	-0.64
$\hat{E}_s/N_{oc}$		dB	8	8	-Infinity	8
SSB_RP	Config 1	dBm/SCS	-87	-87	-Infinity	-87
Io Note3	Config 1	dBm/ 38.16MHz	-55.31	-52.60	-55.31	-52.60
Propagation condition		-	AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 6:	For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.11.2.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $T_{interrupt}$ from the beginning of time period T3, where $T_{interrupt}$ is defined in clause 6.1B.1.2
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$

$T_{search} = (1+L_1)*$ 20 ms.

$T_{processing}$ = 20 ms.

T_{margin} = 2 ms.

$T_{\Delta} = (1+ L_2)$ *20 ms.

$T_{IU} = (1+ L_3)*10 + 10$ ms

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L_1 is the number of SMTC occasions not available at the UE during the intra-frequency detection period, L_2 is the number of SMTC occasions not available at the UE during the time tracking period, where $L_1 + L_2 \le L_{CCA\_DL}$, and L_3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure, where $L_3 \le L_{CCA\_UL}$. $L_3 = 0$ for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by L_1, ,L_2 , L_3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer.

A.11.2.1.3 Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA; unknown target cell

A.11.2.1.3.1 Test Purpose and Environment

This test is to verify the requirement for inter frequency handover requirements from FR1 carrier under CCA to FR1 carrier under CCA specified in clause 6.1B.1.2.

A.11.2.1.3.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.3.2-2, and A.11.2.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.3.2-1: Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA test configurations

Config	Description
1	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.1.3.2-2: General test parameters Inter-frequency handover from FR1 carrier under CCA to FR1 carrier under CCA

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	On the carrier under CCA
	Neighbouring cell		Cell 2	On the carrier under CCA
Final condition	Active cell		Cell 2	On the carrier under CCA
DL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.20.2.1	
	Semi-static channel access Note 2, 3			
UL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.20.2.2	
	Semi-static channel access Note 2,3			
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
T304		ms	500	
L_{CCA_DL}			5	
W_{CCA_DL}		ms	T304	
L_{CCA_UL}			5	
W_{CCA_UL}		ms	T304	
T1		s	5	
T2		s	$\leq T_{interrupt}$	$T_{interrupt}$ is defined in clause 6.1B.1.2
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
		T1	T2	T1	T2

NR RF Channel Number			1		2	
P_{CCA_DL} for dynamic channel access Note 4,6		-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 5,6		-	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 4,6		-	0.75		0.75	
P_{CCA_UL} for semi-static channel access Note 5,6		-	0.87		0.87	
TDD configuration	Config 1		TDDConf.1.1 CCA			
$BW_{channel}$	Config 1		40: $N_{RB,c}$ = 106			
BWP BW	Config 1		40: $N_{RB,c}$ = 106			
DRX Cycle		ms	Not Applicable			
PDSCH Reference	Config 1		SR.1.1 CCA			
CORESET Reference Channel	Config 1		CR1.1 CCA			
Dedicated CORESET RMC configuration	Config 1		CCR.1.1 CCA			
TRS configuration	Config 1		TRS.1.2 TDD			
OCNG Patterns			OP.1			
SMTC Configuration			SMTC.1			
DBT window configuration	Config 1		DBT.1			
SSB configuration for semi-static channel access Note 4, 6	Config 1		SSB.1 CCA			
SSB configuration for dynamic channel access Note 5, 6	Config 1		SSB.2 CCA			
ssb-PositionQCL	Config 1		[1]			
PDSCH/PDCCH subcarrier spacing	Config 1	kHz	30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1	kHz	30 kHz			
PRACH configuration			FR1 PRACH configuration 1 under CCA			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			
N_{oc} Note2	Config 1	dBm/SCS	-95			
$\hat{E}_s/I_{ot}$		dB	4	4	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	4	4	-Infinity	5
SSB_RP	Config 1	dBm/SCS	-91	-91	-Infinity	-90
Io Note3	Config 1	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75
Propagation condition		-	AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 6:	For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.11.2.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $T_{interrupt}$ from the beginning of time period T3, where $T_{interrupt}$ is defined in clause 6.1B.1.2
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin}$

$T_{search} = (3+L_1')*20$ ms.

$T_{processing} = 20$ ms.

$T_{margin} = 2$ ms.

$T_{\Delta} = (1+ L_2) *20$ ms.

$T_{IU} = (1+ L_3)*10 + 10$ ms

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L_1' is the number of SMTC occasions not available at the UE during the inter-frequency detection period, L_2 is the number of SMTC occasions not available at the UE during the time tracking period, where $L_1' + L_2 \le L_{CCA\_DL}$, and L_3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure, where $L_3 \le L_{CCA\_UL}$. $L_3 = 0$ for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by , L_1',L_2 , L_3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer.

A.11.2.1.4 Inter-frequency handover from FR1 carrier under CCA to FR1; known target cell

A.11.2.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the NR with CCA FR1-NR FR1 handover requirements specified in clause 6.1.1.2.

A.11.2.1.4.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.4.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.4.2-2, and A.11.2.1.4.2-3.

The test consists of three successive time periods, with time durations of T1 T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR with CCA shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.11.2.1.4.2-1: Handover from NR with CCA FR1 to NR FR1 test configuration

Config	Description
1	Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.11.2.1.4.2-2: General test parameters handover from NR with CCA FR1 to NR FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	NR cell with CCA
	Neighbouring cell		Cell 2	NR cell
Final condition	Active cell		Cell 2	
DL CCA model			As specified in clause A.3.20.2.1	
UL CCA model			As specified in clause A.3.20.2.2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		s	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤5	
T3		s	1	

Table A.11.2.1.4.2-3: Cell specific test parameters for NR with CCA FR1 – NR FR1 handover test case

Parameter		Unit	Test configuration	Cell 1			Cell 2		
				T1	T2	T3	T1	T2	T3
NR RF Channel Number			1,2,3	1			2		
Duplex mode			1	TDD			FDD		
			2	TDD			TDD		
			3	TDD			TDD		
TDD configuration			1	TDDConf.1.1 CCA			Not Applicable		
			2	TDDConf.1.1 CCA			TDDConf.1.1		
			3	TDDConf.1.1 CCA			TDDConf.2.1		
$BW_{channel}$		MHz	1	40: $N_{RB,c}$ = 106			10: $N_{RB,c}$ = 52		
			2	40: $N_{RB,c}$ = 106			10: $N_{RB,c}$ = 52		
			3	40: $N_{RB,c}$ = 106			40: $N_{RB,c}$ = 106		
BWP BW		MHz	1	40: $N_{RB,c}$ = 106			10: $N_{RB,c}$ = 52		
			2	40: $N_{RB,c}$ = 106			10: $N_{RB,c}$ = 52		
			3	40: $N_{RB,c}$ = 106			40: $N_{RB,c}$ = 106		
DRX Cycle		ms	1,2,3	Not Applicable					
PDSCH Reference measurement channel			1	SR.1.1 CCA			SR.1.1 FDD		
			2	SR.1.1 CCA			SR.1.1 TDD		
			3	SR.1.1 CCA			SR2.1 TDD		
CORESET Reference Channel			1	CR1.1 CCA			CR.1.1 FDD		
			2	CR1.1 CCA			CR.1.1 TDD		
			3	CR1.1 CCA			CR2.1 TDD		
Dedicated CORESET RMC configuration			1	CCR.1.1 CCA			CCR.1.1 FDD		
			2	CCR.1.1 CCA			CCR.1.1 TDD		
			3	CCR.1.1 CCA			CCR.2.1 TDD		
DL CCA probability for semi-static channel access (P_{CCA_DL})DL CCA probability P_{CCA_DL}			1,2,3	0.9375			N/A		
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_1}$)			1,2,3	0.75			N/A		
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_2}$)			1,2,3	0.75			N/A		
UL CCA probability for semi-static channel access P_{CCA_UL}			1,2,3	0.75			N/A		
UL CCA probability for dynamic static channel access P_{CCA_UL}			1,2,3	0.87					
TRS configuration			1	TRS.1.2 TDD			TRS.1.1 FDD		
			2	TRS.1.2 TDD			TRS.1.1 TDD		
			3	TRS.1.2 TDD			TRS.1.2 TDD		
OCNG Patterns				OP.1					
SMTC Configuration				SMTC.1					
SSB Configuration	Semi-static channel access		1,2	SSB.1 CCA (As defined in A.3.10A)			SSB.1 FR1		
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)					
	Semi-static channel access		3	SSB.1 CCA (As defined in A.3.10A)			SSB.2 FR1		
	Dynamic channel access			SSB.2 CCA (As defined in A.3.10A)					
DBT window configuration				As defined in A.3.28.1			Not applicable		
PDSCH/PDCCH subcarrier spacing		kHz	1,2	30 kHz			15 kHz		

			3	30 kHz			30 kHz		
PUCCH/PUSCH subcarrier spacing		kHz	1,2	30 kHz			15 kHz		
			3	30 kHz			30 kHz		
PRACH configuration				FR1 PRACH configuration 1 under CCA			FR1 PRACH configuration 1		
BWP configuration	Initial DL BWP		1,2,3	DLBWP.0.1					
	Dedicated DL BWP		1,2,3	DLBWP.1.1					
	Initial UL BWP		1,2,3	ULBWP.0.1					
	Dedicated UL BWP		1,2,3	ULBWP.1.1					
EPRE ratio of PSS to SSS		dB	1,2,3	0					
EPRE ratio of PBCH DMRS to SSS			1,2,3						
EPRE ratio of PBCH to PBCH DMRS			1,2,3						
EPRE ratio of PDCCH DMRS to SSS			1,2,3						
EPRE ratio of PDCCH to PDCCH DMRS			1,2,3						
EPRE ratio of PDSCH DMRS to SSS			1,2,3						
EPRE ratio of PDSCH to PDSCH			1,2,3						
EPRE ratio of OCNG DMRS to SSS Note1			1,2,3						
EPRE ratio of OCNG to OCNG DMRS Note1			1,2,3						
N_{oc} Note2		dBm/SCS	1,2	[-101]			-98		
			3	[-101]			-95		
$\hat{E}_s/I_{ot}$		dB	1,2,3	8	-3.3	-3.3	-Infinity	2.36	2.36
$\hat{E}_s/N_{oc}$		dB	1,2,3	8	8	8	-Infinity	11	11
SSB_RP	Config 1	dBm/SCS	1,2,3	-90	-90	-90	-Infinity	-87	-87
Io Note3	Config 1	dBm/9.36MHz	1,2,3	-61.41	-57.06	-57.06	-61.41	-57.06	-57.06
Propagation condition		-	1,2,3	AWGN			AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.11.2.1.4.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 112 ms from the beginning of time period T3.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 102 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 112 ms.

A.11.2.1.5 Inter-frequency handover from FR1 carrier under CCA to FR1; unknown target cell

A.11.2.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the NR with CCA FR1-NR FR1 handover requirements specified in clause 6.1.1.2.

A.11.2.1.5.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.5.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.5.2-2, and A.12.2.1.7.2-3.

The test scenario comprises of two carriers and one cell on each carrier. Cell 1 is the NR with CCA cell and Cell 2 is an NR neighbour cell. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2.

Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.5.2-1: Handover from NR with CCA FR1 to NR FR1 test configuration

Config	Description
1	Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.11.2.1.5.2-2: General test parameters handover from NR with CCA FR1 to NR FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	NR cell with CCA
	Neighbouring cell		Cell 2	NR cell
Final condition	Active cell		Cell 2	
DL CCA model			As specified in clause A.3.20.2.1	
UL CCA model			As specified in clause A.3.20.2.2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		s	5	
T2		s	≤5	

Table A.11.2.1.5.2-3: Cell specific test parameters for NR with CCA FR1 – NR FR1 handover test case

Parameter	Unit	Configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number		1, 2, 3	1		2	
Duplex mode		1	TDD		FDD	
		2	TDD		TDD	
		3	TDD		TDD	
DL CCA model		1, 2, 3	As specified in clause A.3.26.2.1		N/A	
UL CCA model		1, 2, 3	As specified in clause A.3.26.2.2			
TDD configuration		1	TDDConf.1.1 CCA		Not Applicable	
		2	TDDConf.1.1 CCA		TDDConf.1.1	
		3	TDDConf.1.1 CCA		TDDConf.2.1	
$BW_{channel}$	MHz	1	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
		2	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW	MHz	1	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
		2	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
		3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
DRX Cycle	ms		Not Applicable			
PDSCH Reference measurement channel		1	SR.1.1 CCA		SR.1.1 FDD	
		2	SR.1.1 CCA		SR.1.1 TDD	
		3	SR.1.1 CCA		SR2.1 TDD	
CORESET Reference Channel		1	CR2.1 TDD		CR.1.1 FDD	
		2	CR2.1 TDD		CR.1.1 TDD	
		3	CR2.1 TDD		CR2.1 TDD	
Dedicated CORESET RMC configuration		1	CCR.1.1 CCA		CCR.1.1 FDD	
		2	CCR.1.1 CCA		CCR.1.1 TDD	
		3	CCR.1.1 CCA		CCR.2.1 TDD	
TRS configuration		1	TRS.1.2 TDD		TRS.1.1 FDD	
		2	TRS.1.2 TDD		TRS.1.1 TDD	
		3	TRS.1.2 TDD		TRS.1.2 TDD	
DL CCA probability for semi-static channel access (P_{CCA_DL})DL CCA probability P_{CCA_DL}		1, 2, 3	0.9375		N/A	
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_1}$)		1, 2, 3	0.75		N/A	
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_2}$)		1, 2, 3	0.75		N/A	
UL CCA probability for semi-static channel access P_{CCA_UL}		1, 2, 3	0.75		N/A	
UL CCA probability for dynamic static channel access P_{CCA_UL}		1, 2, 3	0.87		N/A	
OCNG Patterns		1, 2, 3	OP.1			
SMTC Configuration		1, 2, 3	SMTC.1			
DBT window configuration		1, 2, 3	As defined in A.3.28.1		N/A	
SSB configuration	Semi-static channel access	1,2	SSB.1 CCA (As defined in A.3.10A)		SSB.1 FR1	
	Dynamic channel access		SSB.2 CCA (As defined in A.3.10A)			
	Semi-static channel access	3	SSB.1 CCA (As defined in A.3.10A)		SSB.2 FR1	

	Dynamic channel access		SSB.2 CCA (As defined in A.3.10A)			
ssb-PositionQCL			[1]		N/A	
PDSCH/PDCCH subcarrier spacing	kHz	1	30 kHz		15 kHz	
		2	30 kHz		15 kHz	
		3	30 kHz		30 kHz	
PUCCH/PUSCH subcarrier spacing	kHz	1	30 kHz		15 kHz	
		2	30 kHz		15 kHz	
		3	30 kHz		30 kHz	
PRACH configuration		1,2,3	FR1 PRACH configuration 1		FR1 PRACH configuration 1 under CCA	
BWP configuration	Initial DL BWP	1,2,3	DLBWP.0.1			
	Dedicated DL BWP	1,2,3	DLBWP.1.1			
	Initial UL BWP	1,2,3	ULBWP.0.1			
	Dedicated UL BWP	1,2,3	ULBWP.1.1			
EPRE ratio of PSS to SSS	dB	1,2,3	0			
EPRE ratio of PBCH DMRS to SSS		1,2,3				
EPRE ratio of PBCH to PBCH DMRS		1,2,3				
EPRE ratio of PDCCH DMRS to SSS		1,2,3				
EPRE ratio of PDCCH to PDCCH DMRS		1,2,3				
EPRE ratio of PDSCH DMRS to SSS		1,2,3				
EPRE ratio of PDSCH to PDSCH		1,2,3				
EPRE ratio of OCNG DMRS to SSS Note1		1,2,3				
EPRE ratio of OCNG to OCNG DMRS Note1		1,2,3				
N_{oc} Note2	dBm/SCS	1,2,3	[-101]		-98	
			[-101]		-95	
$\hat{E}_s/I_{ot}$	dB	1,2,3	-Infinity	5	4	4
$\hat{E}_s/N_{oc}$	dB	1,2,3	-Infinity	5	4	4
SSB_RP	dBm/SCS	1,2,3	-Infinity	-93	-94	-94
			-Infinity	-90	-91	-91
Io Note3	dBm/9.36MHz	1,2,3	-70.05	-63.85	-64.59	-64.59
	dBm/38.16MHz	1,2,3	-63.94	-57.75	-58.49	-58.49
Propagation condition	-	1,2,3	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.11.2.1.5.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 132 ms from the beginning of time period T2.
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

$T_{interrupt}$ = 122 ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 132 ms.

A.11.2.1.6 Inter-frequency handover from FR1 to FR1 carrier under CCA; unknown target cell

A.11.2.1.6.1 Test Purpose and Environment

This test is to verify the requirement for inter frequency handover requirements from FR1 to FR1 carrier under CCA specified in clause 6.1B.1.2.

A.11.2.1.6.2 Test Parameters

Supported test configurations are shown in table A.11.2.1.6.2-1. Both handover delay and interruption length are tested by using the parameters in table A.11.2.1.6.2-2, and A.11.2.1.6.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.11.2.1.6.2-1: Inter-frequency handover from FR1 to FR1 carrier under CCA test configurations

Configuration	Description of a cell with CCA	Description of a cell without CCA
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.11.2.1.6.2-2: General test parameters Inter-frequency handover from FR1 to FR1 carrier under CCA

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	On the carrier under CCA
Final condition	Active cell		Cell 2	On the carrier under CCA
DL CCA model			As specified in clause A.3.20.2.1	
UL CCA model			As specified in clause A.3.20.2.2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
T1		s	5	
T2		s	$\leq T_{interrupt}$	$T_{interrupt}$ is defined in clause 6.1B.1.2

Table A.11.2.1.6.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Parameter	Unit	Configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number		1, 2, 3	1		2	
DL CCA probability for semi-static channel access (P_{CCA_DL})DL CCA probability P_{CCA_DL}		1, 2, 3	N/A		0.9375	
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_1}$)		1, 2, 3	N/A		0.75	
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_2}$)		1, 2, 3	N/A		0.75	
UL CCA probability for semi-static channel access P_{CCA_UL}		1, 2, 3	N/A		0.75	
UL CCA probability for dynamic static channel access P_{CCA_UL}		1, 2, 3	N/A		0.87	
TDD configuration		1	N/A		TDDConf.1.1.CCA	
		2	TDDConf.1.1		TDDConf.1.1.CCA	
		3	TDDConf.1.2		TDDConf.1.1.CCA	
$BW_{channel}$		1	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		1	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
DRX Cycle	ms		Not Applicable			
PDSCH Reference		1	SR.1.1 FDD		SR.1.1 CCA	
		2	SR.1.1 TDD		SR.1.1 CCA	
		3	SR.2.1 TDD		SR.1.1 CCA	
CORESET Reference Channel		1	CR.1.1 FDD		CR.1.1 CCA	
		2	CR.1.1 TDD		CR.1.1 CCA	
		3	CR.2.1 TDD		CR.1.1 CCA	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		CCR.1.1 CCA	
		2	CCR.1.1 TDD		CCR.1.1 CCA	
		3	CCR.2.1 TDD		CCR.1.1 CCA	
TRS configuration		1	TRS.1.1 FDD		TRS.1.2 TDD	
		2	TRS.1.1 TDD		TRS.1.2 TDD	
		3	TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns		1, 2, 3	OP.1			
SMTC Configuration		1, 2, 3	SMTC.1			
DBT window configuration		1, 2, 3	N/A		As defined in A.3.28.1	
SSB configuration		1, 2	SSB.1 FR1		SSB.1 CCA for semi-static channel access; SSB.2 CCA for dynamic channel access;	
		3	SSB.2 FR1		SSB.1 CCA for semi-static channel access; SSB.2 CCA for dynamic channel access;	
ssb-PositionQCL			N/A		[1]	
PDSCH/PDCCH subcarrier spacing	kHz	1	15 kHz		30 kHz	
		2	15 kHz		30 kHz	

			3	30 kHz		30 kHz	
PUCCH/PUSCH subcarrier spacing		kHz	1	15 kHz		30 kHz	
			2	15 kHz		30 kHz	
			3	30 kHz		30 kHz	
PRACH configuration				FR1 PRACH configuration 1		FR1 PRACH configuration 1 CCA	
BWP configuration	Initial DL BWP		1, 2, 3	DLBWP.0.1			
	Dedicated DL BWP		1, 2, 3	DLBWP.1.1			
	Initial UL BWP		1, 2, 3	ULBWP.0.1			
	Dedicated UL BWP		1, 2, 3	ULBWP.1.1			
EPRE ratio of PSS to SSS		dB		0			
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15kHz		-98			
N_{oc} Note2	Config 1	dBm/SCS	1, 2	-98			
			3	-95			
$\hat{E}_s/I_{ot}$		dB		4	4	-Infinity	5
$\hat{E}_s/N_{oc}$		dB		4	4	-Infinity	5
SSB_RP	Config 1	dBm/SCS	1, 2	-94	-94	-Infinity	-93
			3	-91	-91	-Infinity	-90
Io Note3	Config 1	dBm/ 9.36MHz	1, 2	-64.59	-64.59	-70.05	-63.85
		dBm/ 38.16MHz	3	-58.49	-58.49	-63.94	-57.75
Propagation condition		-		AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.							

A.11.2.1.6.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $T_{interrupt}$ from the beginning of time period T3, where $T_{interrupt}$ is defined in clause 6.1B.1.2
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2], L_1' is the number of SMTC occasions not available at the UE during the inter-frequency detection period, L_2 is the number of SMTC occasions not available at the UE during the time tracking period, and L_3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. $L_3 = 0$ for Type 2C UL channel access procedure as defined in TS 37.213 [33]. The interruption time considering the potential extensions caused by L_1, L_1', L_2, L_3 and by the UL CCA failure detection/recovery mechanism is limited by the T304 timer. The UE behaviour at the T304 timer expiry is detailed in TS 38.331 [2].

A.11.2.1.7 SA NR FR1 carrier under CCA - E-UTRAN handover with known target cell

A.11.2.1.7.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1 carrier under CCA. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier under CCA and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.11.2.1.7-1. General test parameters are provided in Table A.11.2.1.7-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.11.2.1.7-3 and A.11.2.1.7-4 respectively.

Table A.11.2.1.7-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description of a cell with CCA	Description of a cell without CCA
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested.		

Table A.11.2.1.7-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	NR cell on a carrier under CCA
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
DL CCA model			As specified in clause A.3.20.2.1	
UL CCA model			As specified in clause A.3.20.2.2	
NR measurement quantity			SS-RSRP	
E-UTRAN measurement quantity			RSRP	
b2-Threshold1		dBm	As specified in Table A.11.2.1.7-3	Absolute NR SS-RSRP threshold for event B2
b2-Threshold2EUTRAN		dBm	-98	Absolute E-UTRAN RSRP threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		s	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 9.1.2-1 started before T2 starts
T1		s	5	
T2		s	≤5	
T3		s	1	

Table A.11.2.1.7-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter		Unit	Configuration	Cell 1		
				T1	T2	T3
RF channel number			1, 2	1		
TDD Configuration			1, 2	TDDConf.1.1.CCA		
DL CCA probability for semi-static channel access (P_{CCA_DL})DL CCA probability P_{CCA_DL}			1, 2	0.9375		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)			1, 2	0.75		
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)			1, 2	0.75		
UL CCA probability for semi-static channel access P_{CCA_UL}			1, 2	0.75		
UL CCA probability for dynamic static channel access P_{CCA_UL}			1, 2	0.87		
$BW_{channel}$			1, 2	40: $N_{RB,c}$ = 106 (TDD)		
PDSCH reference measurement channel			1, 2	SR.1.1 CCA		
CORESET reference channel			1, 2	CR.1.1 CCA		
Dedicated CORESET RMC configuration			1, 2	CCR.1.1 CCA		
TRS configuration			1, 2	TRS.1.2 TDD		
OCNG pattern[Note1]			1, 2	OP.1		
BWP	Initial DL BWP		1, 2	DLBWP.0.1		
	Dedicated DL BWP			DLBWP.1.1		
	Initial UL BWP			ULBWP.0.1		
	Dedicated UL BWP			ULBWP.1.1		
SMTC configuration			1, 2	SMTC.1		
DBT window configuration			1, 2	As defined in A.3.28.1		
SSB configuration			1, 2	SSB.1 CCA for semi-static channel access; SSB.2 CCA for dynamic channel access;		
b2-Threshold1		dBm	1, 2	-93		
EPRE ratio of PSS to SSS		dB	1, 2	0		
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS						
N_{oc}[Note2]		dBm/15 KHz	1, 2	-100	-104	-100
N_{oc}[Note2]		dBm/SCS	1, 2	-97	-101	-97

$\hat{E}_s/N_{oc}$	dB	1, 2	12	0	-4
$\hat{E}_s/I_{ot}$ Note3	dB	1, 2	12	0	-4
SS-RSRP Note3	dBm/SCS	1, 2	-85	-101	-101
Io Note3	dBm/38.16 MHz	1, 2	-53.68	-66.9448	-64.49
Propagation condition		1, 2	AWGN		
Antenna Configuration and Correlation Matrix		1, 2	1x2 Low		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.11.2.1.7-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2		
			T1	T2	T3
RF channel number		1, 2	2		
Duplex mode		1	FDD		
		2	TDD		

TDD special subframe configuration[Note1]		2	6		
TDD uplink-downlink configuration[Note1]		2	1		
$BW_{channel}$	MHz	1, 2	10 MHz: $N_{RB,c}$ = 50		
PRACH Configuration[Note2]		1	4		
		2	53		
PDSCH parameters: DL Reference Measurement Channel[Note3]		1	10 MHz: R.3 FDD		
		2	10 MHz: R.0 TDD		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1	10 MHz: R.6 FDD		
		2	10 MHz: R.6 TDD		
OCNG Patterns[Note3]		1	10 MHz: OP.10 FDD		
		2	10 MHz: OP.1 TDD		
PBCH_RA	dB	1, 2	0		
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA[Note4]					
OCNG_RB[Note4]					
N_{oc}[Note5]	dBm/15kHz	1, 2	-98		
$\hat{E}_s/N_{oc}$	dB	1, 2	-Infinity	8	78
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2	-Infinity	78	78
RSRP[Note6]	dBm/15kHz	1, 2	-Infinity	-90	-90
SCH_RP[Note6]	dBm/15kHz	1, 2	-Infinity	-90	-90
Io[Note6]	dBm/9MHz	1, 2	-67.21 +10log($N_{RB,c}$/100)	-58.57 +10log($N_{RB,c}$/100)	-58.57 +10log($N_{RB,c}$/100)
Propagation Condition		1, 2	AWGN		
Antenna Configuration and Correlation Matrix[Note7]		1, 2	1x2 Low		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 6:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.11.2.1.7.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 85 ms.

A.11.2.1.8 SA NR FR1 carrier under CCA - E-UTRAN handover with unknown target cell

A.11.2.1.8.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1 carrier under CCA. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier under CCA and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.11.2.1.8-1. General test parameters are provided in Table A.11.2.1.8-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.11.2.1.8-3 and A.11.2.1.8-4 respectively.

Table A.11.2.1.8-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description of a cell with CCA	Description of a cell without CCA
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, TDD duplex mode
2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	LTE 10 MHz bandwidth, FDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested.		

Table A.11.2.1.8-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	NR cell on a carrier under CCA
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
DL CCA model			As specified in clause A.3.20.2.1	
UL CCA model			As specified in clause A.3.20.2.2	
NR measurement quantity			SS-RSRP	
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
T1		s	≤5	
T2		s	1	

Table A.11.2.1.8-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter	Unit	Configuration	Cell 1	
			T1	T2

RF channel number			1, 2	1	
DL CCA probability for semi-static channel access (P_{CCA_DL})DL CCA probability P_{CCA_DL}			1, 2	0.9375	
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_1}$)			1, 2	0.75	
DL CCA probability for dynamic channel access ($P_{CCA\_DL\_2}$)			1, 2	0.75	
UL CCA probability for semi-static channel access P_{CCA_UL}			1, 2	0.75	
UL CCA probability for dynamic static channel access P_{CCA_UL}			1, 2	0.87	
TDD Configuration			1, 2	TDDConf.1.1.CCA	
$BW_{channel}$		MHz	1, 2	40: $N_{RB,c}$ = 106 (TDD)	
PDSCH reference measurement channel			1, 2	SR.1.1 CCA	
CORESET reference channel			1, 2	CR.1.1 CCA	
Dedicated CORESET RMC configuration			1, 2	CCR.1.1 CCA	
TRS configuration			1, 2	TRS.1.2 TDD	
OCNG pattern[Note1]			1, 2	OP.1	
BWP	Initial DL BWP		1, 2	DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	
	Initial UL BWP			ULBWP.0.1	
	Dedicated UL BWP			ULBWP.1.1	
SMTC configuration			1, 2	SMTC.1	
DBT window configuration			1, 2	As defined in A.3.28.1	
SSB configuration			1, 2	SSB.1 CCA for semi-static channel access; SSB.2 CCA for dynamic channel access;	
EPRE ratio of PSS to SSS		dB	1, 2	0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N_{oc}[Note2]		dBm/15 KHz	1, 2	-98	
N_{oc}[Note2]		dBm/SCS	1, 2	-95	
$\hat{E}_s/N_{oc}$		dB	1, 2	0	0
$\hat{E}_s/I_{ot}$[Note3]		dB	1, 2	0	0
SS-RSRP[Note3]		dBm/SCS	1, 2	-95	-95
Io[Note3]		dBm/38.16 MHz	1, 2	-60.94	-60.94
Propagation condition			1, 2	AWGN	
Antenna Configuration and			1, 2	1x2 Low	

Correlation Matrix			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.			

Table A.11.2.1.8-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2	2	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	10 MHz: $N_{RB,c}$ = 50	
PRACH Configuration[Note2]		1	4	
		2	53	
PDSCH parameters: DL Reference Measurement Channel[Note3]		1	10 MHz: R.3 FDD	
		2	10 MHz: R.0 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1	10 MHz: R.6 FDD	
		2	10 MHz: R.6 TDD	
OCNG Patterns[Note3]		1	10 MHz: OP.10 FDD	
		2	10 MHz: OP.1 TDD	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note4]				
OCNG_RB[Note4]				
N_{oc}[Note5]	dBm/15kHz	1, 2	-98	
$\hat{E}_s/N_{oc}$	dB	1, 2	-Infinity	7
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2	-Infinity	7
RSRP[Note6]	dBm/15kHz	1, 2	-Infinity	-91
SCH_RP[Note6]	dBm/15kHz	1, 2	-Infinity	-91
Io[Note6]	dBm/9MHz	1, 2	-70.22	-62.43
Propagation Condition		1, 2	AWGN	
Antenna Configuration and Correlation Matrix[Note7]		1, 2	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].				

Note 3:	DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 4:	OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 5:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 6:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.11.2.1.8.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

$T_{interrupt}$ = 115 ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 165 ms.

A.11.2.2 RRC connection mobility control

A.11.2.2.1 RRC re-establishment

A.11.2.2.1.1 Intra-frequency RRC Re-establishment with CCA in FR1

A.11.2.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay with CCA in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.1.1-1, table A.11.2.2.1.1.1-2 and table A.11.2.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell with CCA, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.11.2.2.1.1.1-1: Supported test configurations

Configuration	Description
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case with CCA

Parameter		Unit	Value	Comment
Initial Condition	Active cell	-	Cell1	Cell 1 is with CCA.
	Neighbour cells	-	Cell2	Cell 2 is with CCA.
Final condition	Active cell	-	Cell2	
RF Channel Number		-	1	
DL CCA model	Dynamic channel access Note 1, 3	-	As specified in clause A.3.26.2.1	
	Semi-static channel access Note 2, 3	-		
UL CCA model	Dynamic channel access Note 1, 3	-	As specified in clause A.3.26.2.2	
	Semi-static channel access Note 2,3	-		
Time offset between cells		-	3 μs	Synchronous cells
N310		-	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	Minimum consecutive in-sync indications from lower layers
T310		ms	0	Radio link failure timer; T310 is disabled
T311		ms	3000	RRC re-establishment timer
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
SSB configuration	Dynamic channel access Note 1, 3	-	SSB.2 CCA	Table A.3.10A.1.2-1
	Semi-static channel access Note 2, 3	-	SSB.1 CCA	Table A.3.10A.1.1-1
DBT window configuration		-	DBT.1	Table A.3.28.1-1
SMTC configuration		-	SMTC pattern 1	
DRX cycle length		s	OFF	
PRACH configuration		-	FR1 PRACH configuration 1 under CCA	Table A.3.8A.2.1-1
T1		s	5	
T2		ms	480	Time for the UE to detect RLF
T3		s	2	

NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.11.2.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case with CCA

Parameter	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3
TDD configuration	-	TDDConf.1.1 CCA			TDDConf.1.1 CCA		
DL CCA probability P_{CCA_DL} for dynamic channel access Note 4,6	-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75			$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		
DL CCA probability P_{CCA_DL} for semi-static channel access Note 5,6	-	P_{CCA_DL}=0.9375			P_{CCA_DL}=0.9375		
UL CCA probability P_{CCA_UL}	-	1			1		
PDSCH RMC configuration		SR.1.1 CCA			SR.1.1 CCA		
RMSI CORESET RMC configuration		CR.1.1 CCA			CR.1.1 CCA		
Dedicated CORESET RMC configuration		CCR.1.1 CCA			CCR.1.1 CCA		
OCNG Pattern		OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
TRS configuration		TRS.1.2 TDD			N/A		
Initial DL BWP configuration		DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		ULBWP.0.1			ULBWP.0.1		
Active DL BWP confgiuration		DLBWP.1.1	N/A	N/A	N/A	N/A	DLBWP.1.1
Active UL BWP configuration		ULBWP.1.1	N/A	N/A	N/A	N/A	ULBWP.1.1
RLM-RS		SSB			SSB		
$\hat{E}_s/I_{ot}$	dB	1.54	-infinity	-infinity	-3.79	4	4
N_{oc} Note2	dBm/SCS	-95					
N_{oc} Note2	dBm/15 kHz	-98					
$\hat{E}_s/N_{oc}$	dB	7	-infinity	-infinity	4	4	4
SS-RSRP Note3	dBm/SCS	-88	-infinity	-infinity	-91	-91	-91
Io	dBm/38.16 MHz	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagation Condition		AWGN					

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 5: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.11.2.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell with CCA shall be less than 1350 + MAX (200, (5+K_1) x 20) ms.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish\_delay\_CCA} = T_{UE\_re-establish\_delay\_CCA} + T_{UL\_grant}$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay\_CCA} = 50\text{ ms} + T_{identify\_intra\_NR\_CCA} + \sum_{i=1}^{N_{freq}-1} T_{identify\_inter\_NR\_CCA,i} + T_{SI-NR\_CCA} + T_{PRACH\_CCA}$$

Where

N_{freq} = 1

$T_{identify\_intra\_NR\_CCA}$ = MAX (200 ms, (5+K_1) x T_{SMTC}), where

K_1 is the number of SMTC occasions not available at the UE due to DL CCA failures during RRC re-establishment period on the carrier with CCA.

T_{SMTC} = 20 ms is the SMTC periodicity.

$T_{identify\_inter\_NR\_CCA}$ = 0 ms

T_{SI-NR_CCA} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T_{PRACH_CCA} = $T_{SSB,RO}$ + 10 ms, where:

- $T_{SSB,RO}$ is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39], which is $T_{SSB,RO}$=10 ms for FR1 PRACH configuration 1 under CCA.

This gives a total of 1350 + MAX (200, (5+K_1) x 20) ms.

A.11.2.2.1.2 Inter-frequency RRC Re-establishment with CCA in FR1

A.11.2.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay with CCA in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.2.1-1, table A.11.2.2.1.2.1-2 and table A.11.2.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell with CCA, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.11.2.2.1.2.1-1: Supported test configurations

Configuration	Description
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Value	Comment
Initial Condition	Active cell	-	Cell1	Cell 1 is with CCA.
	Neighbour cells	-	Cell2	Cell 2 is with CCA.
Final condition	Active cell	-	Cell2	
RF Channel Number		-	1	
DL CCA model	Dynamic channel access Note 1, 3	-	As specified in clause A.3.20.2.1	
	Semi-static channel access Note 2, 3	-		
UL CCA model	Dynamic channel access Note 1, 3	-	As specified in clause A.3.20.2.2	
	Semi-static channel access Note 2, 3	-		
Time offset between cells		-	3 μs	Synchronous cells
N310		-	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	Minimum consecutive in-sync indications from lower layers
T310		ms	0	Radio link failure timer; T310 is disabled
T311		ms	3000	RRC re-establishment timer
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
SSB configuration	Dynamic channel access Note 1, 3	-	SSB.2 CCA	Table A.3.10A.1.2-1
	Semi-static channel access Note 2, 3	-	SSB.1 CCA	Table A.3.10A.1.1-1
DBT window configuration		-	[DBT.1]	Table A.3.28.1-1
SMTC configuration		-	SMTC pattern 1	
DRX cycle length		s	OFF	
PRACH configuration		-	[TBD]	
T1		s	[5]	
T2		ms	[200]	Time for the UE to detect RLF
T3		s	[2]	
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3
TDD configuration		TDDConf.1.1 CCA			TDDConf.1.1 CCA		
DL CCA probability P_{CCA_DL} for dynamic channel access Note 4,6	-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75			$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		
DL CCA probability P_{CCA_DL} for semi-static channel access Note 5,6	-	P_{CCA_DL}=0.9375			P_{CCA_DL}=0.9375		
UL CCA probability P_{CCA_UL}	-	1			1		
PDSCH RMC configuration		SR.1.1 CCA			SR.1.1 CCA		
RMSI CORESET RMC configuration		CR.1.1 CCA			CR.1.1 CCA		
Dedicated CORESET RMC configuration		CCR.1.1 CCA			CCR.1.1 CCA		
OCNG Pattern		OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
TRS configuration		TRS.1.2 TDD			N/A		
Initial DL BWP configuration		DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		ULBWP.0.1			ULBWP.0.1		
Active DL BWP confgiuration		DLBWP.1.1	N/A	N/A	N/A	N/A	DLBWP.1.1
Active UL BWP configuration		ULBWP.1.1	N/A	N/A	N/A	N/A	ULBWP.1.1
RLM-RS		SSB			SSB		
$\hat{E}_s/I_{ot}$	dB	1.54	-infinity	-infinity	-3.79	4	4
N_{oc} Note2	dBm/SCS	[-101]					
N_{oc} Note2	dBm/15 kHz	[-104]					
$\hat{E}_s/N_{oc}$	dB	7	-infinity	-infinity	4	4	4
SS-RSRP Note3	dBm/SCS	-88	-infinity	-infinity	-91	-91	-91
Io	dBm/9.36 MHz	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagation Condition		AWGN					

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 5: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.11.2.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than TBD s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish_{delay_{CCA}}} = T_{UE_{re}-establish_{delay_{CCA}}} + T_{UL_{grant}}$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay\_CCA} = 50 \text{ ms} + T_{identify\_intra\_NR\_CCA} + \sum_{i=1}^{N_{freq}-1} T_{identify\_inter\_NR\_CCA,i} + T_{SI-NR\_CCA} + T_{PRACH\_CCA}$$

Where

$T_{identify\_intra\_NR\_CCA}$: 0 ms

$T_{identify\_inter\_NR\_CCA,i}$: MAX (200 ms, ([6]+K2,i) x TSMTC, i),

where

K2,i is the number of SMTC not available at the UE during RRC re-establishment period on the "i" th carrier with CCA

$T_{SMTC,i}$: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*.

N_{freq} = 2

T_{SI-NR_CCA} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH_CCA} = (1+ K_3)*$T_{SSB,RO}$ + 10 ms, where:

- $T_{SSB,RO}$ is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39].

[- K_3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. K_3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].]

This gives a total of TBD ms.

A.11.2.2.1.3 Intra-frequency RRC Re-establishment with CCA in FR1 without serving cell timing

A.11.2.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay with CCA in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.3.1-1, table A.11.2.2.1.3.1-2 and table A.11.2.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell with CCA, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.11.2.2.1.3.1-1: Supported test configurations

Configuration	Description
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Value	Comment
Initial Condition	Active cell	-	Cell1	Cell 1 is with CCA.
	Neighbour cells	-	Cell2	Cell 2 is with CCA.
Final condition	Active cell	-	Cell2	
RF Channel Number		-	1	
DL CCA model	Dynamic channel access Note 1,3	-	As specified in clause A.3.26.2.1	
	Semi-static channel access Note 2,3	-		
UL CCA model	Dynamic channel access Note 1,3	-	As specified in clause A.3.26.2.2	
	Semi-static channel access Note 2,3	-		
Time offset between cells		-	3 µs	Synchronous cells
N310		-	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	Minimum consecutive in-sync indications from lower layers
T310		ms	0	Radio link failure timer; T310 is disabled
T311		ms	3000	RRC re-establishment timer
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
SSB configuration	Dynamic channel access Note 1, 3	-	SSB.2 CCA	Table A.3.10A.1.2-1
	Semi-static channel access Note 2, 3	-	SSB.1 CCA	Table A.3.10A.1.1-1
DBT window configuration		-	DBT.1	Table A.3.28.1-1
SMTC configuration		-	SMTC pattern 1	
DRX cycle length		s	OFF	
PRACH configuration		-	FR1 PRACH configuration 1	Table A.3.8A.2.1-1
T1		s	5	
T2		ms	6	Time for the UE to detect RLF
T3		s	3	
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Cell 1			Cell 2		
		T1	T2	T3	T1	T2	T3
TDD configuration		TDDConf.1.1 CCA			TDDConf.1.1 CCA		
DL CCA probability P_{CCA_DL} for dynamic channel access Note 4,6	-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75			$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		
DL CCA probability P_{CCA_DL} for semi-static channel access Note 5,6	-	P_{CCA_DL}=0.9375			P_{CCA_DL}=0.9375		
UL CCA probability P_{CCA_UL}	-	1			1		
PDSCH RMC configuration		SR.1.1 CCA			SR.1.1 CCA		
RMSI CORESET RMC configuration		CR.1.1 CCA			CR.1.1 CCA		
Dedicated CORESET RMC configuration		CCR.1.1 CCA			CCR.1.1 CCA		
OCNG Pattern		OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
TRS configuration		TRS.1.2 TDD			N/A		
Initial DL BWP configuration		DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		ULBWP.0.1			ULBWP.0.1		
Active DL BWP confgiuration		DLBWP.1.1	N/A	N/A	N/A	N/A	DLBWP.1.1
Active UL BWP configuration		ULBWP.1.1	N/A	N/A	N/A	N/A	ULBWP.1.1
RLM-RS		SSB			SSB		
$\hat{E}_s/I_{ot}$	dB	4	-infinity	-infinity	-infinity	-infinity	4
N_{oc} Note2	dBm/SCS	-95					
N_{oc} Note2	dBm/15 kHz	-98					
$\hat{E}_s/N_{oc}$	dB	7	-infinity	-infinity	-infinity	-infinity	4
SS-RSRP Note3	dBm/SCS	-91	-infinity	-infinity	-infinity	-infinity	-91
Io	dBm/38.16 MHz	-58.50	-63.94	-63.94	-63.94	-63.94	-58.50
Propagation Condition		AWGN					

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy.
NOTE 5: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy.
NOTE 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

A.11.2.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 1350 + MAX (800 ms, (10+ K_1) x 20) ms.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish\_delay\_CCA} = T_{UE\_re-establish\_delay\_CCA} + T_{UL\_grant}$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay\_CCA} = 50\text{ ms} + T_{identify\_intra\_NR\_CCA} + \sum_{i=1}^{N_{freq}-1} T_{identify\_inter\_NR\_CCA,i} + T_{SI-NR\_CCA} + T_{PRACH\_CCA}$$

Where,

N_{freq} = 1

$T_{identify\_intra\_NR}$ = MAX (800 ms, (10+ K_1) x T_{SMTC}), where

K_1 is the number of SMTC occasions not available at the UE due to DL CCA failures during RRC re-establishment period on the carrier with CCA.

T_{SMTC} is the SMTC periodicity which is 20ms.

$T_{identify\_inter\_NR\_CCA}$ = 0 ms

T_{SI-NR_CCA} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

T_{PRACH_CCA} = (1+ K_3)*$T_{SSB,RO}$ + 10 ms, where:

- $T_{SSB,RO}$ is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39]. It is 10 ms for FR1 PRACH configuration 1 under CCA.
- K_3 = 0.

This gives total $T_{UE\_re-establish\_delay\_CCA}$= 1350 + MAX (800 ms, (10+ K_1) x 20) ms.

A.11.2.2.1.4 Inter-frequency RRC Re-establishment from NR FR1 carrier without CCA to NR FR1 carrier under CCA

A.11.2.2.1.4.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay requirement for RRC re-establishment from NR FR1 carrier without CCA to NR FR1 inter-frequency carrier under CCA with unknown target cell. These tests will verify the requirements in clause 6.2.1A.

The test parameters are given in table A.11.2.2.1.4.1-1, table A.11.2.2.1.4.1-2 and table A.11.2.2.1.4.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.11.2.2.1.4.1-1: Supported test configurations inter-frequency RRC re-establishment from NR FR1 without under CCA to NR FR1 inter-frequency carrier under CCA

Configuration	Source cell without CCA	Target cell with CCA
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.11.2.2.1.4.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case from NR FR1 carrier without CCA to NR FR1 inter-frequency carrier under CCA

Parameter		Unit	Value	Comment
Initial condition	Active cell		Cell1	
	Neighbour cells		Cell2	
Final condition	Active cell		Cell2	
RF Channel Number			1, 2	
Time offset between cells			3 μs	Synchronous cells
DL CCA model	Dynamic channel access Note 1,3	-	As specified in clause A.3.26.2.1	
	Semi-static channel access Note 2,3	-		
UL CCA model	Dynamic channel access Note 1,3	-	As specified in clause A.3.26.2.2	
	Semi-static channel access Note 2,3	-		
N310		-	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	Minimum consecutive in-sync indications from lower layers
T310		ms	0	Radio link failure timer; T310 is disabled
T311		ms	5000	RRC re-establishment timer
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
DRX cycle length		s	OFF	
PRACH configuration			FR1 PRACH configuration 1	Table A.3.8A.2.1-1
T1		s	5	
T2		ms	480	Time for the UE to detect RLF
T3		s	$\geq T_{UE\_re\text{-}establish\_delay\_CCA}$	As defined in clause 6.2.1A
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.2.1.4.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case from NR FR1 carrier without CCA to NR FR1 inter-frequency carrier under CCA

Parameter		Test config	Unit	Cell 1			Cell 2		
				T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A			TDDConf.1.1.CCA		
		2		TDDConf.1.1			TDDConf.1.1.CCA		
		3		TDDConf.2.1			TDDConf.1.1.CCA		
PDSCH RMC configuration		1		SR.1.1 FDD			SR.1.1 CCA		
		2		SR.1.1 TDD			SR.1.1 CCA		
		3		SR.2.1 TDD			SR.1.1 CCA		
RMSI CORESET RMC configuration		1		CR.1.1 FDD			CR.1.1 CCA		
		2		CR.1.1 TDD			CR.1.1 CCA		
		3		CR.2.1 TDD			CR.1.1 CCA		
Dedicated CORESET RMC configuration		1		CCR.1.1 FDD			CCR.1.1 CCA		
		2		CCR.1.1 TDD			CCR.1.1 CCA		
		3		CCR.2.1 TDD			CCR.1.1 CCA		
OCNG Pattern		1		OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
TRS configuration		1		TRS.1.1 FDD			TRS.1.2 TDD		
		2		TRS.1.1 TDD			TRS.1.2 TDD		
		3		TRS.1.2 TDD			TRS.1.2 TDD		
SMTC configuration		1,2,3		SMTC.1			SMTC.1		
SSB configuration	Semi- static channel acces	1,2		SSB.1 FR1			SSB.1 CCA		
	Semi- static channel acces	3		SSB.2 FR1			SSB.1 CCA		
	Dymamic channel acces	1,2		SSB.1 FR1			SSB.2 CCA		
	Dymamic channel acces	3		SSB.2 FR1			SSB.2 CCA		
Initial DL BWP configuration		1,2,3		DLBWP.0.1			DLBWP.0.1		
Initial UL BWP configuration		1,2,3		ULBWP.0.1			ULBWP.0.1		
Active DL BWP confgiuration		1,2,3		DLBWP.1.1	N/A	N/A	N/A	N/A	DLBWP.1.1
Active UL BWP configuration		1,2,3		ULBWP.1.1	N/A	N/A	N/A	N/A	ULBWP.1.1
DL CCA probability for semi-static channel access (P_{CCA_DL})		1,2,3		N/A	N/A	N/A	1	1	0.9375
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_1}$)		1,2,3		N/A	N/A	N/A	1	1	0.75
DL CCA probability for for dynamic static channel access ($P_{CCA\_DL\_2}$)		1,2,3		N/A	N/A	N/A	1	1	0.75
UL CCA probability (P_{CCA_UL})		1,2,3		N/A	N/A	N/A	1	1	1
RLM-RS		1,2,3		SSB			SSB		
$\hat{E}_s/I_{ot}$		1,2,3	dB	4	-infinity	-infinity	-infinity	-infinity	7
N_{oc} Note2		1,2,3	dBm/15 KHz	-98					
N_{oc} Note2		1,2	dBm/SCS	-98					
		3		-95					
$\hat{E}_s/N_{oc}$		1,2,3	dB	4	-infinity	-infinity	-infinity	-infinity	7
SS-RSRP Note3		1, 2	dBm/SCS	-94	-infinity	-infinity	-infinity	-infinity	-91
		3		-91	-infinity	-infinity	-infinity	-infinity	-88
Io		1,2	dBm/9.36 MHz	-64.59	-70. 05	-70. 05	-70. 05	-70.05	-62.26
		3	dBm/38.16 MHz	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15
Propagation Condition		1,2,3		AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.20.2.
Note 5:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.11.2.2.1.4.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less $T_{UE\_re-establish\_delay\_CCA}$.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish\_delay\_CCA} = T_{UE\_re-establish\_delay\_CCA} + T_{UL\_grant}$$

Where:

T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE\_re-establish\_delay\_CCA} = 50\text{ ms} + T_{identify\_intra\_NR\_CCA} + \sum_{i=1}^{N_{freq}-1} T_{identify\_inter\_NR\_CCA,i} + T_{SI-NR\_CCA} + T_{PRACH\_CCA}$$

$N_{freq} = 2$

$T_{identify\_intra\_NR\_CCA}$ = MAX (800 ms, (10+ K_1) x 20) ms

$T_{identify\_inter\_NR\_CCA}$ = MAX (800 ms, ([13]+$K_{2,2}$) x 20) ms

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH_CCA} = It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{PRACH_CCA} = (1+ K_3)*$T_{SSB,RO}$ + 10 ms; where K_3=0 and $T_{SSB,RO}$=10 ms for FR1 PRACH configuration 1 under CCA.

K_1 is the number of SMTC occasions not available at the UE due during RRC re-establishment period on the carrier with CCA and with RF channel number # 1.

$K_{2,2}$ is the number of SMTC occasions not available at the UE during RRC re-establishment period on the carrier with CCA and with RF channel number # 2.

This gives total $T_{UE\_re-establish\_delay\_CCA}$=1350+MAX (800 ms, (10+ K_1) x 20) ms+MAX (800 ms, ([13]+$K_{2,2}$) x 20) ms.

A.11.2.2.2 Random Access

A.11.2.2.2.1 4-step RA type contention-based random access for NR PCell with CCA

A.11.2.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.1.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.1.1-2.

Table A.11.2.2.2.1.1-1: Supported test configurations for contention based random access test for FR1 PCell with CCA

Config	Description
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Void	

Table A.11.2.2.2.1.1-2: General test parameters for contention based random access test for FR1 PCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1		SSB.3 CCA	As defined in A.3.10A
	Note 5, 6	Config 1		SSB.4 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1		As specified in A.3.26.2.1	
UL CCA model		Config 1		As specified in A.3.26.2.2	
Duplex Mode for Cell 2		Config 1		TDD	
TDD Configuration		Config 1		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2		Config 1	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{CMAX,f,c}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration				FR1 PRACH configuration 1 under CCA	As defined in A.3.8A.2.
DL CCA probability P_{CCA_DL}	Note 4, 6			0.9375	
	Note 5, 6			0.75 / 0.75	
L_{CCA_DL} Note 7				4	
W_{CCA_DL} Note 8				Inf	
UL CCA probability P_{CCA_UL}	Note 4, 6			0.87	
	Note 5, 6			0.75	
L_{CCA_UL} Note 7				5	
W_{CCA_UL} Note 8				Inf	
Semi-static channel access config period Note 4, 6			ms	2	

Propagation Condition	-	AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel. Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters. Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}. Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration. Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}. Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.			

A.11.2.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.11.2.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2A.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*, if the UL CCA is successful.

The three requirements below are relevant for all cases of PRACH transmissions described within the whole clause A.11.2.2.2.1.2:

- The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

- In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

- In case of UL CCA failure, The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 transmission is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2A.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.11.2.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2A.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.11.2.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2A.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.11.2.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2A.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.11.2.2.2.2 4-step RA type non-contention based random access for NR PSCell with CCA

A.11.2.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.2.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.2.1-2.

Table A.11.2.2.2.2.1-1: Supported test configurations for non-contention based random access test for FR1 PCell with CCA

Config	Description
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Void	

Table A.11.2.2.2.2.1-2: General test parameters for non-contention based random access test for FR1 PCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1		SSB.3 CCA	As defined in A.3.10A
	Note 5, 6	Config 1		SSB.4 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1		As specified in A.3.26.2.1	
UL CCA model		Config 1		As specified in A.3.26.2.2	
Duplex Mode for Cell 2		Config 1		TDD	
TDD Configuration		Config 1		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *rsrp-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2		Config 1	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{CMAX,f,c}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration				FR1 PRACH configuration 2 under CCA	As defined in A.3.8A.2.
DL CCA probability P_{CCA_DL}	Note 4, 6			0.9375	
	Note 5, 6			0.75 / 0.75	
L_{CCA_DL} Note 7				4	
W_{CCA_DL} Note 8				Inf	

UL CCA probability P_{CCA_UL}	Note 4, 6		0.87	
	Note 5, 6		0.75	
L_{CCA_UL} Note 7			5	
W_{CCA_UL} Note 8			Inf	
Semi-static channel access config period Note 4, 6		ms	2	
Propagation Condition		-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.11.2.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.11.2.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2A.2.2.1 for SSB-based Random Access Preamble transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

The three requirements below are relevant for all cases of PRACH transmissions described within the clause A.11.2.2.2.2.2:

- The System Simulator shall implement the UL CCA model of A.3.26.2 for the RACH occasions where PRACH transmissions are expected. The System Simulator shall monitor the RACH occasions to detect if the UE is transmitting PRACH preambles. If a PRACH transmission is detected on a RACH occasion that is expected to have UL CCA failure, the test is considered as failed.

- In case of CCA DL failure, the test equipment should verify that the UE does not transmit PRACH for semi-static channel access mode; for dynamic channel access mode it is assumed that RACH occasions are always scheduled within a UE-initiated COT.

- In case of UL CCA failure The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.2.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2A.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.2.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2A.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of Random Access Response.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.2. The power of the first preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.3 2-step RA type contention-based random access for NR PCell with CCA

A.11.2.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.3.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.3.1-2.

Table A.11.2.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test for FR1 PCell with CCA

Config	Description
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Void	

Table A.11.2.2.2.3.1-2: General test parameters for 2-step RA type contention based random access with successRAR test for FR1 PCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1		SSB.3 CCA	As defined in A.3.10A
	Note 5, 6	Config 1		SSB.4 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1		As specified in A.3.26.2.1	
UL CCA model		Config 1		As specified in A.3.26.2.2	
Duplex Mode for Cell 2		Config 1		TDD	
TDD Configuration		Config 2		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2		Config 1	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{CMAX,f,c}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
MsgA Configuration				FR1 MsgA configuration 1 under CCA	As defined in A.3.20A.2.
msgA-RSRP-ThresholdSSB			dBm	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
DL CCA probability P_{CCA_DL}	Note 4, 6			0.9375	
	Note 5, 6			0.75 / 0.75	
L_{CCA_DL} Note 7				4	
W_{CCA_DL} Note 8				Inf	
UL CCA probability P_{CCA_UL}	Note 4, 6			0.87	
	Note 5, 6			0.75	
L_{CCA_UL} Note 7				5	
W_{CCA_UL} Note 8				Inf	
Semi-static channel access config period Note 4, 6			ms	2	
Propagation Condition			-	AWGN	

Note 1:	OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2:	SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3:	The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7:	L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8:	A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.11.2.2.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.11.2.2.2.3.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2A.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*, if the UL CCA is successful.

The three requirements below are relevant for all cases of MsgA transmissions described within the clause A.11.2.2.2.3.2:

- The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

- In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

- The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble transmission shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.3.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2A.3.1.2 the System Simulator shall transmit a MsgB containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB(s) and shall transmit an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful and if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting ACK in the case of CCA UL failure. If ACK transmission is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB(s) contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.1.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.4 2-step RA type non-contention-based random access for NR PCell with CCA

A.11.2.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits when subject to CCA. This test will verify the requirements in Clause 6.2.2A.3 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1, which operates on a carrier frequency with CCA. Supported test parameters are shown in Table A.11.2.2.2.4.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.11.2.2.2.4.1-2.

Table A.11.2.2.2.4.1-1: Supported test configurations for non-contention based random access test for FR1 PCell with CCA

Config	Description
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Void	

Table A.11.2.2.2.4.1-2: General test parameters for non-contention based random access test for FR1 PCell with CCA

Parameter			Unit	Test-1	Comments
SSB Configuration	Note 4, 6	Config 1		SSB.3 CCA	As defined in A.3.10A
	Note 5, 6	Config 1		SSB.4 CCA	As defined in A.3.10A
DBT Window Configuration		Config 1		DBT.1	As specified in A.3.28.1
DL CCA model		Config 1		As specified in A.3.26.2.1	
UL CCA model		Config 1		As specified in A.3.26.2.2	
Duplex Mode for Cell 1		Config 1		TDD	
TDD Configuration		Config 1		TDDConf.1.1 CCA	
OCNG Pattern Note 1				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 3		Config 1		SR.1.1 CCA	As defined in A.3.1A.1.
NR RF Channel Number				1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH_DMRS to SSS			dB		
EPRE ratio of PBCH to PBCH_DMRS			dB		
EPRE ratio of PDCCH_DMRS to SSS			dB		
EPRE ratio of PDCCH to PDCCH_DMRS			dB		
EPRE ratio of PDSCH_DMRS to SSS			dB		
EPRE ratio of PDSCH to PDSCH_DMRS			dB		
msgA-*RSRP-ThresholdSSB*			dBm	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRP		dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index 1 is set to be below configured msgA-*RSRP-ThresholdSSB*
	N_{oc}	Config 1	dBm/15kHz	-101	
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSRP		dBm/ SCS	-115	
Io Note 2		Config 1	dBm	-62.2/38.16MHz	For symbols without SSB index 1
ss-PBCH-BlockPower			dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{CMAX,f,c}$)			dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
MsgA Configuration				FR1 MsgA configuration 2 under CCA	As defined in A.3.20A.2.
DL CCA probability P_{CCA_DL}	Note 4, 6			0.9375	
	Note 5, 6			0.75 / 0.75	
L_{CCA_DL} Note 7				4	

W_{CCA_DL} Note 8			Inf	
UL CCA probability P_{CCA_UL}	Note 4, 6		0.87	
	Note 5, 6		0.75	
L_{CCA_UL} Note 7			5	
W_{CCA_UL} Note 8			Inf	
Semi-static channel access config period Note 4, 6		ms	2	
Propagation Condition		-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.
Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic channel occupancy and semi-static channel occupancy configuration.
Note 7: L_{CCA_DL} and L_{CCA_UL} are chosen such that preambleTransMax > 5 + L_{CCA_DL} + L_{CCA_UL}.
Note 8: A window W_{CCA_DL}=W_{CCA_UL}=Inf is used to indicate that L_{CCA_DL} and L_{CCA_UL} are considered during the entire duration of a test run.

A.11.2.2.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.11.2.2.2.4.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2A.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA PRACH on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

The three requirements below are relevant for all cases of MsgA transmissions described within the clause A.11.2.2.2.4.2:

- The System Simulator shall implement the UL CCA model for the MsgA occasions (i.e. both MsgA PRACH and MsgA PUSCH occasions) where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on MsgA occasions that are expected to have UL CCA failure, the test is considered as failed.

- In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode; for dynamic channel access mode it is assumed that MsgA occasions are always scheduled within a UE-initiated COT.

- The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated PRACH transmission power in case of UL CCA failure.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2A.3.2.2 the System Simulator shall transmit a MsgB containing a fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble if UL CCA is successful. The System Simulator shall monitor if the UE is transmitting msg3 when CCA UL failure. If a msg3 is detected on a grant expected to have UL CCA failure, the test is considered as failed. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB's contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

The system simulator shall implement the UL CCA model of A.3.26.2 for the MsgA occasions where MsgA System Simulator transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on a MsgA occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power in case UL CCA failure.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2A.3.2.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles. In case of CCA DL failure, the test equipment should delay the transmission of MsgB.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

The System Simulator shall implement the UL CCA model of A.3.26.2 for the MsgA occasions where MsgA transmissions are expected. The System Simulator shall monitor the MsgA occasions to detect if the UE is transmitting MsgA. If a MsgA transmission is detected on a MsgA occasion that is expected to have UL CCA failure, the test is considered as failed.

In case of CCA DL failure, the test equipment should verify that the UE does not transmit MsgA for semi-static channel access mode.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS38.321 [7], and transmit with the calculated MsgA transmission power in case UL CCA failure.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2A.3. The power of the first MsgA preamble shall be -16 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be $0.6 + 3(\mu + 2)$ dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18], where μ indicates the MsgA PUSCH numerology. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1.2.

A.11.2.2.3 RRC connection release with redirection

A.11.2.2.3.1 Redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA

A.11.2.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR FR1 carrier under CCA to NR FR1 carrier under CCA specified in clause 6.2.3.2.3.

A.11.2.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.11.2.2.3.1.2-1. The time delay is tested by using the parameters in table A.11.2.2.3.1.2-2, and A.11.2.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.11.2.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.2.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	On the carrier under CCA
	Neighbouring cell		Cell 2	On the carrier under CCA
Final condition	Active cell		Cell 2	On the carrier under CCA
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
DL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.26.2.1	
	Semi-static channel access Note 2, 3			
UL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.26.2.2	
	Semi-static channel access Note 2,3			
T1		s	5	
T2		s	≥ $T_{connection\_release\_redirect\_NR\_CCA}$	$T_{connection\_release\_redirect\_NR\_CCA}$ is defined in clause 6.2.3.2.3
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter		Unit	Cell 1		Cell 2	
			T1	T2	T1	T2
NR RF Channel Number			1		2	
P_{CCA_DL} for dynamic channel access Note 4,6		-	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	
P_{CCA_DL} for semi-static channel access Note 5,6		-	P_{CCA_DL}=0.9375		P_{CCA_DL}=0.9375	
P_{CCA_UL} for dynamic channel access Note 4,6		-	1		1	
P_{CCA_UL} for semi-static channel access Note 5,6		-	1		1	
L_{CCA_DL} Note 7			N/A		8	
W_{CCA_DL} Note 7		ms	N/A		$T_{identify\text{-}NR\_CCA}$	
TDD configuration	Config 1		TDDConf.1.1 CCA			
$BW_{channel}$	Config 1		40: $N_{RB,c}$ = 106			
BWP BW	Config 1		40: $N_{RB,c}$ = 106			
DRX Cycle		ms	Not Applicable			
PDSCH Reference	Config 1		SR.1.1 CCA			
RMSI CORESET Reference Channel	Config 1		CR.1.1 CCA			
Dedicated CORESET RMC configuration	Config 1		CCR.1.1 CCA			
TRS configuration	Config 1		TRS.1.2 TDD			
OCNG Patterns			OP.1			
SMTC Configuration			SMTC.1			
DBT configuration			DBT.1			
SSB configuration for semi-static channel access Note 4, 6	Config 1		SSB.1 CCA			
SSB configuration for dynamic channel access Note 5, 6	Config 1		SSB.2 CCA			
ssb-PositionQCL	Config 1		[1]			
PDSCH/PDCCH subcarrier spacing	Config 1	kHz	30 kHz			
PUCCH/PUSCH subcarrier spacing	Config 1	kHz	30 kHz			
PRACH configuration			FR1 PRACH configuration 1 under CCA			
BWP configuration	Initial DL BWP		DLBWP.0.1			
	Dedicated DL BWP		DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS		dB	0			
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			
N_{oc} Note2	Config 1	dBm/SCS	-95			
$\hat{E}_s/I_{ot}$		dB	4	4	-infinity	4

$\hat{E}_s/N_{oc}$		dB	4	4	-infinity	4
Io[Note3]	Config 1	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49
Propagation condition		-	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only. Note 7: As defined in clause 6.2.3.2.3 for T_{rs} ≤ 40 ms.						

A.11.2.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $T_{connection\_release\_redirect\_NR\_CCA}$ ms from the beginning of time period T2, where $T_{connection\_release\_redirect\_NR\_CCA}$ is defined in clause 6.2.3.2.3.
The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection\_release\_redirect\_NR\_CCA} = T_{RRC\_procedure\_delay} + T_{identify\text{-}NR\_CCA} + T_{SI\text{-}NR\_CCA} + T_{RACH\_CCA},$$

where:

$T_{RRC\_procedure\_delay}$ = 110 ms in the test.

$T_{identify\text{-}NR\_CCA}$ = MAX (680 ms, $(L_1+11) \times 20$ ms) in the test.

$T_{SI\text{-}NR}$ = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

T_{RACH_CCA} is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell.

L_1 is the number of SMTC occasions not available at the UE due to DL CCA failures. The test equipment ensure that number of L_1 in target cell does not exceed $L_{1,max}$ using the configured L_{CCA_DL} as in clause A.3.26.2.1;

A.11.2.2.3.2 Redirection from NR FR1 carrier without CCA to NR FR1 carrier with CCA

A.11.2.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR FR1 carrier without CCA to NR FR1 carrier with CCA specified in clause 6.2.3.2.3.

A.11.2.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.11.2.2.3.2.2-1. The time delay is tested by using the parameters in table A.11.2.2.3.2.2-2, and A.11.2.2.3.2.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.11.2.2.3.2.2-1: Redirection from NR to NR test configurations

Configuration	Source cell without CCA	Target cell with CCA
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.11.2.2.3.2.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	On the carrier without CCA
	Neighbouring cell		Cell 2	On the carrier under CCA
Final condition	Active cell		Cell 2	On the carrier under CCA
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
DL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.26.2.1	
	Semi-static channel access Note 2, 3			
UL CCA model	Dynamic channel access Note 1, 3		As specified in clause A.3.26.2.2	
	Semi-static channel access Note 2,3			
T1		s	5	
T2		s	$\geq T_{connection\_release\_redirect\_NR\_CCA}$	$T_{connection\_release\_redirect\_NR\_CCA}$ is defined in clause 6.2.3.2.3
NOTE 1: For a UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 2: For a UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.2.2.3.2.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter			Unit	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number				1		2	
P_{CCA_DL} for dynamic channel access Note 4,6				N/A		$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75
P_{CCA_DL} for semi-static channel access Note 5,6				N/A		P_{CCA_DL}=0.9375	P_{CCA_DL}=0.9375
P_{CCA_UL} for dynamic channel access Note 4,6				N/A		1	1
P_{CCA_UL} for semi-static channel access Note 5,6				N/A		1	1
L_{CCA_DL} Note 7				N/A		8	
W_{CCA_DL} Note 7			ms	N/A		$T_{identify\text{-}NR\_CCA}$	
Duplex mode		Config 1		FDD		TDD	
		Config 2,3		TDD			
TDD configuration		Config 1		Not Applicable		TDDConf.1.1 CCA	
		Config 2		TDDConf.1.1		TDDConf.1.1 CCA	
		Config 3		TDDConf.2.1		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1	MHz	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		Config 2		10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		Config 3		40: $N_{RB,c}$ = 106			
BWP BW		Config 1	MHz	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		Config 2		10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106	
		Config 3		40: $N_{RB,c}$ = 106			
DRX Cycle			ms	Not Applicable			
PDSCH Reference measurement channel		Config 1		SR.1.1 FDD		SR.1.1 CCA	
		Config 2		SR.1.1 TDD		SR.1.1 CCA	
		Config 3		SR2.1 TDD		SR.1.1 CCA	
RMSI CORESET RMC configuration		Config 1		CR.1.1 FDD		CR.1.1 CCA	
		Config 2		CR.1.1 TDD		CR.1.1 CCA	
		Config 3		CR.2.1 TDD		CR.1.1 CCA	
Dedicated CORESET RMC configuration		Config 1		CCR.1.1 FDD		CCR.1.1 CCA	
		Config 2		CCR.1.1 TDD		CCR.1.1 CCA	
		Config 3		CCR.2.1 TDD		CCR.1.1 CCA	
OCNG Patterns				OCNG pattern 1			
SSB Configuration	Semi-static channel acces	Config 1,2		SSB.1 FR1		SSB.1 CCA	
	Dymamic channel acces	Config 3		SSB.2 FR1		SSB.2 CCA	
	Semi-static channel acces	Config 1,2		SSB.1 FR1		SSB.1 CCA	
	Dymamic channel acces	Config 3		SSB.2 FR1		SSB.2 CCA	
SMTC configuration		Config 1,2		SMTC.1 FR1		SMTC.2 FR1	
		Config 3		SMTC.2 FR1			
PDSCH/PDCCH subcarrier spacing		Config 1,2	kHz	15 kHz		30 kHz	
		Config 3		30 kHz			
PUCCH/PUSCH subcarrier spacing		Config 1,2	kHz	15 kHz		30 kHz	
		Config 3		30 kHz			
PRACH configuration				FR1 PRACH configuration 1 under CCA in Table A.3.8A.2.1-1			
BWP configuration		Initial DL BWP		DLBWP.0.1			
		Dedicated DL BWP		DLBWP.1.1			
		Initial UL BWP		ULBWP.0.1			
		Dedicated UL BWP		ULBWP.1.1			
EPRE ratio of PSS to SSS							

EPRE ratio of PBCH DMRS to SSS		dB	0			
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15kHz	-98			
N_{oc} Note2	Config 1,2	dBm/SCS	-98		-95	
	Config 3		-95			
$\hat{E}_s/I_{ot}$		dB	4	4	-infinity	4
$\hat{E}_s/N_{oc}$		dB	4	4	-infinity	4
Io Note3	Config 1,2	dBm/9.36 MHz	-64.59	-64.59	N/A	N/A
	Config 3	dBm/38.16 MHz	-58.49	-58.49	-63.94	-58.49
Propagation condition		-	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 6: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.
Note 7: As defined in clause 6.2.3.2.3 for $T_{rs} \leq 40$ ms.

A.11.2.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $T_{connection\_release\_redirect\_NR\_CCA}$ ms from the beginning of time period T2, where $T_{connection\_release\_redirect\_NR\_CCA}$ is defined in clause 6.2.3.2.3.
The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection\_release\_redirect\_NR\_CCA} = T_{RRC\_procedure\_delay} + T_{identify\text{-}NR\_CCA} + T_{SI\text{-}NR\_CCA} + T_{RACH\_CCA},$$

where:

$T_{RRC\_procedure\_delay}$ = 110 ms in the test.

$T_{identify\text{-}NR\_CCA}$ = MAX (680 ms, $(L_1+11) \times 20$ ms) in the test.

$T_{SI\text{-}NR\_CCA}$ = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

T_{RACH_CCA} is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. $T_{RACH\_CCA} = (1+L_2)\times T_{SSB,RO}$ + 10 ms; where $T_{SSB,RO}$ = 10 ms for FR1 PRACH configuration 1.

L_1 is the number of SMTC occasions not available at the UE due to DL CCA failures. The test equipment shall ensure that L_1 does not exceed $L_{1,max}$. In the test $L_{1,max}= L_{CCA\_DL}$ which is defined in clause A.3.26.2.1.

L_2 is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. $L_2 = 0$ in the test.

The total delay, $T_{connection\_release\_redirect\_NR\_CCA}$, shall be less than 1410 + MAX (680, $(L_1+11)\times 20$) ms.

A.11.3 Timing

A.11.3.1 UE transmit timing

A.11.3.1.1 UE Transmit Timing Test with PCell under DL CCA

A.11.3.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb when PCell is subject to DL CCA and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 11.3.1.1.1-1

Table A.11.3.1.1.1-1: Supported test configuration for UE transmit timing test

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz

For this test a single NR cell is used. Table A.11.3.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.11.3.1.1.1-3.

Table A.11.3.1.1.1-2: Cell Specific Test Parameters for UE transmit timing test

Parameter	Unit	Configuration	Test1	Test2
SSB ARFCN		1	1	1
TDD configuration		1	TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1	40: $N_{RB,c}$ = 106	
Initial BWP Configuration		1	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1	DLBWP.1.1 ULBWP.1.1	
DRX Cycle	ms	1	N/A	DRX.8 Note5
DL CCA model		1	As specified in clause A.3.26.2.1	
UL CCA model		1	As specified in clause A.3.26.2.2	
PDSCH Reference measurement channel		1	SR.1.1 CCA	
RMSI CORESET Reference Channel		1	CR.1.1 CCA	
Dedicated CORESET Reference Channel		1	CCR.1.1 CCA	
OCNG Patterns		1	OP.1	
SSB configuration: Semi- static channel acces		1	SSB.1 CCA	
SSB configuration: Dymamic channel acces		1	SSB.2 CCA	
SMTC Configuration		1	SMTC.1 FR1	
TRS configuration		1	TRS.1.2 TDD	
DL CCA probability for semi-static channel access (P_{CCA_DL})		1	0.9375	0.9375
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		1	0.75	0.75
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		1	0.75	0.75
UL CCA probability (P_{CCA_UL})		1	1	1
EPRE ratio of PSS to SSS	dB	1	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/30 KHz	1	-95	-95
$\hat{E}_s/I_{ot}$		1	3	3
$\hat{E}_s/N_{oc}$		1	3	3
SS-RSRP Note3	dBm/30 kHz	1	-92	-92
Io Note3	dBm/38.1MHz	1	-59.2	-59.2
Propagation condition		1	AWGN	
SRS Config		1	SRSConf.1 Note6	SRSConf.2 Note6

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: DRX related parameters are given in Table A.3.3.8-1
Note 6: SRS configs are given in Table A.11.3.1.1.1-3

Note 7:	Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.
Note 8:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.11.3.1.1.1-3: SRS Configuration for UE transmit timing test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-ResourceId	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	14 for test configuration 1,2 25 for test configuration 3	25	Matches $N_{RB,c}$
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 0	Offset to align with DRX periodicity
	sequenceId	0	0	Any 10 bit number

A.11.3.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

1) Setup NR PCell according to parameters given in Table A.11.3.1.1.1-1.

2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.

   a. The N_{TA} offset value (in T_c units) is 25600

   b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1

3) The test system shall adjust the timing of the DL path by values given in Table A.11.3.1.1.2-1

Table A.11.3.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjustment Value	
	Test1	Test2
30	+32*64T_c	+16*64T_c

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within (N_{TA} + N_{TA_offset}) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within (N_{TA} + N_{TA_offset}) ×T_c ± T_e of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.11.3.2 UE timing advance

A.11.3.2.1 UE Timing Advance Adjustment Accuracy with PCell under DL CCA

A.11.3.2.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.11.3.2.1.2 Test Parameters

Supported test configurations are shown in table A.11.3.2.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.11.3.2.1.2-2, A.11.3.2.1.2-3 and A.11.3.2.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.11.3.2.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.11.3.2.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.11.3.2.1.2-1: Supported test configuration for timing advance test

Config	Description
1	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE supporting SA operation only on NR band(s) with shared spectrum access is required to be tested	

Table A.11.3.2.1.2-2: General test parameters for timing advance test

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T_A) value during T1		31	$N_{TA\_new} = N_{TA\_old}$ for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T_A) value during T2		39	For 30 kHz SCS $N_{TA\_new} = N_{TA\_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	s	5	

Table A.11.3.2.1.2-3: Cell specific test parameters for timing advance test

Parameter			Unit	Test1	
				T1	T2
TDD configuration		Config 1		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1	MHz	40: $N_{RB,c}$ = 106	
BWP BW		Config 1	MHz	40: $N_{RB,c}$ = 106	
DRX Cycle		Config 1	ms	Not Applicable	
DL CCA model		Config 1		As specified in clause A.3.26.2.1	
UL CCA model		Config 1		As specified in clause A.3.26.2.2	
PDSCH Reference measurement channel		Config 1		SR.1.1 CCA	
CORESET Reference Channel		Config 1		CR.1.1 CCA	
TRS configuration		Config 1		TRS.1.2 TDD	
OCNG Patterns		Config 1		OCNG pattern 1	
SMTC configuration		Config 1		SMTC.1 FR1	
SSB configuration	Semi-static channel acces	Config 1		SSB.1 CCA	
	Dymamic channel acces	Config 1		SSB.2 CCA	
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1		1	
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1		1	
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1		1	
UL CCA probability P_{CCA}		Config 1		1	
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note2		Config 1	dBm/30 kHz	-95	
$\hat{E}_s/I_{ot}$			dB	3	
$\hat{E}_s/N_{oc}$			dB	3	
Io Note3		Config 1	dBm/ 38.16MHz	-62.58	
Propagation condition			-	AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4:	Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.
Note 5:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.11.3.2.1.2-4: Sounding Reference Symbol Configuration for Timing Advance Accuracy Test

Field	Value	Comment
c-SRS	24	Frequency hopping is disabled
b-SRS	0	
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=4 for SCS 30kHz	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition.
nrofSymbols	n1	
repetitionFactor	n1	
combOffset-n2	0	transmissionComb setting
cyclicShift-n2	0	
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

A.11.3.2.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. *k+1* slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.11.4 Signalling characteristics

A.11.4.1 Radio link monitoring

A.11.4.1.1 Introduction

In the test cases specified in clause A.11.4.1, any uplink signal transmitted by the UE is used for detecting the in-/out-of-sync state of the UE. In terms of measurement, the uplink signal is verified based on the UE output power:

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal.
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

A.11.4.1.2 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

A.11.4.1.2.1 Test purpose and environment

The purpose of this test is to verify that the UE properly detects the out-of-sync and in-sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 PCell radio link monitoring requirements in clause 8.1A.

In the test, UE is configured to perform RLM based on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.11.4.1.2.1-1. The test parameters are given in Tables A.11.4.1.2.1-2, A.11.4.1.2.1-3, and A.11.4.1.2.1-4 below. There is one cell (Cell 1), which is the active NR cell in FR1, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of three successive time periods, with time duration of T1, T2 and T3, respectively. Figure A.11.4.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40 ms) in the test.

Table A.11.4.1.2.1-1: Supported test configurations.

Configuration	Description
1	TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.4.1.2.1-2: General test parameters for PCell out-of-sync testing in non-DRX mode.

Parameter		Unit	Value
			Test 1, Test 2
Active PCell			Cell 1
RF Channel Number			1
DL CCA model			As specified in clause A.3.20.2.1
UL CCA model			As specified in clause A.3.20.2.2
Duplex mode	Config 1		TDD
$BW_{channel}$	Config 1	MHz	40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1		[DLBWP.0.1]
DL dedicated BWP configuration	Config 1		[DLBWP.1.1]
UL initial BWP configuration	Config 1		[ULBWP.0.1]
UL dedicated BWP configuration	Config 1		[ULBWP.1.1]
TDD configuration	Config 1		TBD
CORESET Reference Channel	Config 1		TBD
SSB configuration	Config 1		TBD
DBT window configuration	Config 1		TBD
PDSCH/PDCCH subcarrier spacing	Config 1		30 kHz
PRACH Configuration	Config 1		TBD
SSB index assigned as RLM RS			0
OCNG parameters			[OP.1]
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
Out of sync transmission parameters	DCI format		[1-0]
	Number of Control OFDM symbols		[2]
	Aggregation level	CCE	[8]
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	[4]
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	[4]
	DMRS precoder granularity		REG bundle size
	REG bundle size		[6]
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	TBD
T311 timer		ms	TBD
N310			TBD
N311			TBD
CSI-RS configuration for CSI reporting	Config 1		[CSI-RS.2.1 TDD]
CSI-RS for tracking	Config 1		[TRS.1.2 TDD]
T1		s	TBD
T2		s	TBD
T3		s	TBD
D1		s	TBD

NOTE 1: All configurations are assigned to the UE prior to the start of time period T1. NOTE 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.11.4.1.2.1-3: Cell-specific test parameters for PCell out-of-sync testing in non-DRX mode.

Parameter		Unit	Test 1			Test 2		
			T1	T2	T3	T1	T2	T3
DL CCA probability P_{CCA_DL}	Note 6,8		TBD			TBD		
	Note 7,8							
UL CCA probability P_{CCA_UL}			TBD			TBD		
EPRE ratio of PDCCH DMRS to SSS		dB	4			4		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0			0		
EPRE ratio of PBCH DMRS to SSS		dB	0			0		
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB						
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR[Note 3,4] on RLM-RS	Config 1	dB	1	[-7]	-15	1	TBD	TBD
SNR on other channels and signals	Config 1	dB	1			1		
N_{oc}	Config 1	dBm/SCS	-95			-95		
Propagation condition			TDL-C 300 ns 100 Hz			TDL-C 300 ns 100 Hz		
NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows. NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG. NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows. NOTE 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3, respectively, in Figure A.10.3.1.2.1-1. NOTE 5: The SNR values are specified for testing a UE which supports 2 RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 is A.3.6. NOTE 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. NOTE 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. NOTE 8: For UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.								

Table A.11.4.1.2.1-4: Measurement gap configuration for PCell out-of-sync testing in non-DRX mode.

Field	Test 1	Test 2
	Value	Value
gapOffset	0	0
NOTE: Ensure that RLM RS is partially overlapped with measurement gap0		

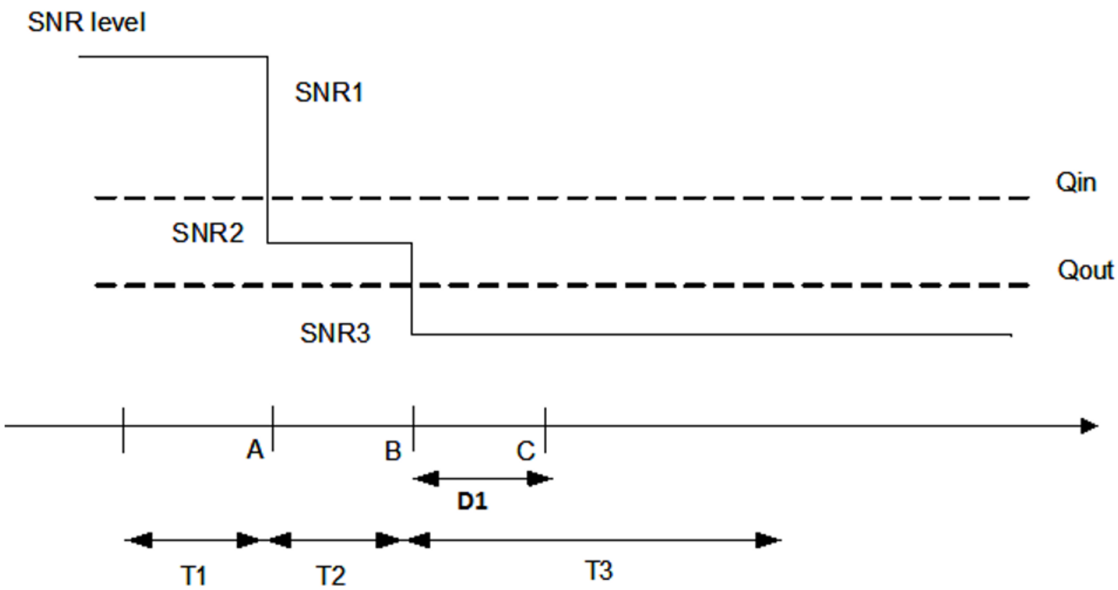

Figure A.11.4.1.2.1-1: SNR variation for out-of-sync testing.

A.11.4.1.2.2 Test requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

- During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.
- The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

In Test 1, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot <-7 dB.

In Test 2, the UE is verified to meet the out-of-sync requirement for RLM-RS SSB Es/Iot ≥-7 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.11.4.1.3 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

A.11.4.1.3.1 Test purpose and environment

The purpose of this test is to verify that the UE properly detects the out-of-sync and in-sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 PCell radio link monitoring requirements in clause 8.1A.

In the test, UE is configured to perform RLM based on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to '*rlf*'. Supported test configurations are shown in table A.11.4.1.3.1-1. The test parameters are given in Tables A.11.4.1.3.1-2, and A.11.4.1.3.1-3 below. There is one cell (Cell 1), which is the active NR cell in FR1, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model.

The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5, respectively. Figure A.11.4.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE transmits according to UL CCA model.

Table A.11.4.1.3.1-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz

Table A.11.4.1.3.1-2: General test parameters for PCell in-sync testing in non-DRX mode.

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
DL CCA model			As specified in clause A.3.20.2.1
UL CCA model			As specified in clause A.3.20.2.2
Duplex mode	Config 1		TDD
$BW_{channel}$	Config 1	MHz	40: $N_{RB,c}$ = 106
DL initial BWP configuration	Config 1		[DLBWP.0.1]
DL dedicated BWP configuration	Config 1		[DLBWP.1.1]
UL initial BWP configuration	Config 1		[ULBWP.0.1]
UL dedicated BWP configuration	Config 1		[ULBWP.1.1]
TDD Configuration	Config 1		TBD
CORESET Reference Channel	Config 1		TBD
SSB Configuration	Config 1		TBD
DBT window configuration	Config 1		TBD
PDSCH/PDCCH subcarrier spacing	Config 1		30 kHz
PRACH Configuration	Config 1		TBD
SSB index assigned as RLM RS			0
OCNG parameters			[OP.1]
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
In sync transmission parameters	DCI format		[1-0]
	Number of Control OFDM symbols		[2]
	Aggregation level	CCE	[4]
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	[0]
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	[0]
	DMRS precoder granularity		REG bundle size
	REG bundle size		[6]
Out of sync transmission parameters	DCI format		[1-0]
	Number of Control OFDM symbols		[2]
	Aggregation level	CCE	[8]
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	[4]
	Ratio of hypothetical PDCCH DMRS	dB	[4]

	energy to average SSS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		[6]
DRX			OFF
Gap pattern ID			N/A
Layer 3 filtering			Enabled
T310 timer		ms	TBD
T311 timer		ms	TBD
N310			TBD
N311			TBD
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.2 TDD
T1		s	TBD
T2		s	TBD
T3		s	TBD
T4		s	TBD
T5		s	TBD
D1		s	TBD
NOTE 1: All configurations are assigned to the UE prior to the start of time period T1. NOTE 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.11.4.1.3.1-3: Cell-specific test parameters for PCell in-sync testing in non-DRX mode.

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
DL CCA probability P_{CCA_DL}			TBD				
UL CCA probability P_{CCA_UL}			TBD				
EPRE ratio of PDCCH DMRS to SSS		dB	4				
EPRE ratio of PDCCH to PDCCH DMRS		dB	0				
EPRE ratio of PBCH DMRS to SSS		dB	0				
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	[-7]	[-15]	[-4.5]	1
SNR on other channels and signals	Config 1	dB	1				
N_{oc}	Config 1	dBm/SCS	-95				
Propagation condition			TDL-C 300ns 100Hz				

NOTE 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in slots with RMC burst transmission and is not transmitted during muted slots or during DBT windows.
NOTE 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
NOTE 3: SNR levels correspond to the signal to noise ratio over the transmitted SSS REs during DBT windows.
NOTE 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.11.4.1.3.1-1.
NOTE 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4 RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

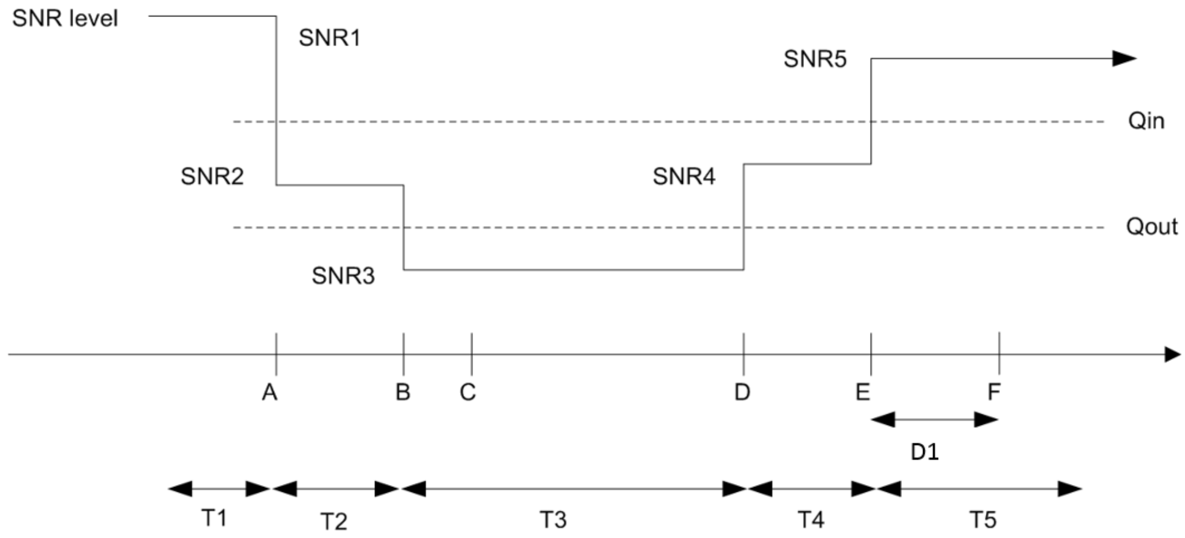

Figure A.11.4.1.3.1-1: SNR variation for in-sync testing.

A.11.4.1.3.2 Test requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

- During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.11.4.1.4 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode

A.11.4.1.4.1 Test purpose and environment

A.11.4.1.4.2 Test requirements

A.11.4.1.5 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in DRX mode

A.11.4.1.5.1 Test purpose and environment

A.11.4.1.5.2 Test requirements

A.11.4.2 Interruption

A.11.4.2.1 NR interruptions during Scell operations with CCA on PCell and SCell

A.11.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify NR PCell interruptions during Scell operations on an NR SCC with CCA. This test will verify the interruption requirements for NR PCell in NR SA specified in TS 38.133 clause 8.2.2 and 8.3A. Supported test configurations are shown in table A.11.4.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.11.4.2.1.1-2 and A.11.4.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 and Cell2 are PCell and SCell. Both of cell 1 and cell 2 are subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the PCell are continuously scheduled in DL. The power of signals on cell 1 and 2 is not modified during the test.

Prior to T1, a connection is started with cell 1 as the PCell, and measurements of cell 2 are configured with gap pattern 0, such that cell 2 is reported. This ensures that cell 2 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying Scell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the Scell is configured.

The point in time at which the MAC-CE message implying Scell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying Scell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying Scell release is received at the UE antenna connector, defines the start of time period T5.

Table A.11.4.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.4.2.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	
Active PCell		Cell1	PCell on RF channel number 1.
Configured SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1, Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	160	
T1	s	<10	
T2	s	<10	
T3	s	<10	
T4	s	<10	
T5	s	<10	

Table A.11.4.2.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

Parameter		Unit	Cell1	Cell2
			T1 T2 T3 T4 T5	T1 T2 T3 T4 T5
TDD configuration	Config 1		TDDConf.1.1 CCA	TDDConf.1.1 CCA
$BW_{channel}$	Config 1	MHz	40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
DL CCA model	Config 1		As specified in clause A.3.20.2.1	As specified in clause A.3.20.2.1
DL CCA probability for semi-static channel access^{Note6,8}	P_{CCA_DL}		0.9375	0.9375
DL CCA probability for dynamic channel access^{Note7,8}	$P_{CCA\_DL\_1}$		0.75	0.75
	$P_{CCA\_DL\_2}$		0.75	0.75
UL CCA model	Config 1		As specified in clause A.3.20.2.2	---
UL CCA probability for semi-static channel access	P_{CCA_UL}		0.87	---
UL CCA probability for dynamic channel access	P_{CCA_UL}		0.75	---
Initial BWP Configuration	Config 1		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP Configuration	Config 1		DLBWP.1.1	DLBWP.1.1
Initial UL BWP Configuration	Config 1		ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP Configuration	Config 1		ULBWP.1.1	ULBWP.1.1
PDSCH reference meassurement channel	Config 1		SR.1.1 CCA	---
RMSI CORESET parameters	Config 1		CR.1.1 CCA	CR.1.1 CCA
PDCCH CORESET parameters	Config 1		CCR.1.1 CCA	CCR.1.1 CCA
TRS configuration	Config 1		TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns			OP.1	OP.1
SSB configuration for semi-static channel access^{Note6,8}	Config 1		SSB.1 CCA	SSB.1 CCA
SSB configuration for dynamic channel access^{Note7,8}	Config 1		SSB.2 CCA	SSB.2 CCA
SMTC Configuration	Config 1		SMTC.1	SMTC.1
DBT window configuration	Config 1		DBT.1	DBT.1
TCI state			TCI.State.0	TCI.State.0
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} $^{Note\ 2}$		dBm/15 kHz	-104	-104
SS-RSRP $^{Note\ 3}$		dBm/15 kHz	-87	-87
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
Io^{Note3}	Config 1	dBm/38.16MHz	-52.86	-52.86
Time offset to Cell1 $^{Note\ 4}$		ms	3	3

Time offset to Cell2 Note 5	μs	-	3
Propagation Condition		AWGN	AWGN
Note 1: OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess. Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.			

A.11.4.2.1.2 Test Requirements

The UE shall meet the interruption requirements for Scell addition on the victim Pcell in clause 8.2.1 during time T1

The UE shall meet the interruption requirements for Scell activation on the victim Pcell in clause 8.2.1during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for Scell deactivation on the victim PCell in clause 8.2.1during time T3. There shall be a single interruption with time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for deactivated Scell measurements on the victim PCell in clause 8.2.1 during time T4. The interruptions shall be within the time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for Scell release on the victim PCell in clause 8.2.1 during time T5.

The rate of correct events observed during repeated tests shall be at least 90%.

A.11.4.3 SCell activation and deactivation delay

A.11.4.3.1 SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 160 ms SCell measurement cycle

A.11.4.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell, with PCell and SCell both under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

The supported test configurations are shown in Table A.11.4.3.1.1-1.

The test parameters are given in Table A.11.4.3.1.1-2 and cell-specific parameters in Table A.11.4.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in NR with CCA, and Cell2 (SCell) on radio channel 2 (SCC) in NR with CCA. Before the test starts the UE is connected to Cell 1, but is not aware of Cell 2, as the UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report a valid CSI in PCell for the activated SCell at latest in slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, as defined in clause 8.3A.2. The UE shall start reporting CSI in PCell in first available uplink resource for CSI reporting following slot $m+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}}{\mathrm{NR\ slot\ length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption shall fall within the time window specified in clause 8.3.2.

The point in time at which the MAC message is received by at the UE antenna connector, in a slot # denoted n, defines the start of time period T3. The UE shall complete the activation at latest in slot $n+\frac{T_{\mathrm{HARQ}}+3\mathrm{ms}}{\mathrm{NR\ slot\ length}}$. Any PCell interruption shall fall within the time window specified in clause 8.3A.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received, while taking into account CCA failures on SCC.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.11.4.3.1.1-1: Supported test configurations for SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 160 ms SCell measurement cycle

Configuration	Description
1	With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.4.3.1.1-2: General test parameters for known SCell activation with PCell and SCell under CCA, 160 ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two radio channels (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ TAE as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
T3	s	1	During this time the UE shall deactivate the SCell.
T_{HARQ}	ms	k_1×NR slot length	k_1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
$T_{CSI\_Reporting}$	ms	$10 + 5 \cdot 2^{\mu_{DL}}$	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] μ_{DL} is the subcarrier spacing configuration for DL

Table A.11.4.3.1.1-3: Cell specific test parameters for known SCell activation case with PCell and SCell under CCA, 160 ms SCell measurement cycle

Parameter		Unit	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
Duplex mode	Config 1		TDD			TDD		
TDD configuration	Config 1		TDDConf.1.1 CCA			TDDConf.1.1 CCA		
$BW_{channel}$	Config 1	MHz	40: $N_{RB,c}$ = 106			40: $N_{RB,c}$ = 106		
DL CCA model			As specified in clause A.3.26.2.1			As specified in clause A.3.26.2.1		
UL CCA model			As specified in clause A.3.26.2.2			As specified in clause A.3.26.2.2		
DL CCA probability for semi-static channel accessNote5,7	P_{CCA_DL}		0.9375			0.9375		
DL CCA probability for dynamic channel accessNote6,7	$P_{CCA\_DL\_1}$		0.75			0.75		
	$P_{CCA\_DL\_2}$		0.75			0.75		
UL CCA probability for semi-static channel access	P_{CCA_UL}		0.87			0.87		
UL CCA probability	P_{CCA_UL}		0.75			0.75		
L_{CCA_DL} Note 8			2			2		
W_{CCA_DL} Note 8		ms	$T_{activation\_time\_withCCA}$			$T_{activation\_time\_withCCA}$		
Initial downlink BWP configuration			DLBWP.0.2			DLBWP.0.2		
Initial uplink BWP configuration			ULBWP.0.1			ULBWP.0.1		
Dedicated downlink BWP configuration			DLBWP.0.2			DLBWP.0.2		
Dedicated uplink BWP configuration			ULBWP.0.1			ULBWP.0.1		
TCI state			TCI.State.0			TCI.State.0		
TRS Configuration	Config 1		TRS.1.2 TDD			TRS.1.2 TDD		
PDSCH Reference measurement channel	Config 1		SR.1.1 CCA			SR.1.1 CCA		
Dedicated CORESET parameters	Config 1		CCR.1.3 CCA			SR.1.1 CCA		
RMSI CORESET parameters	Config 1		CR.1.1 CCA			SR.1.1 CCA		
OCNG Patterns Note1			OP.1			OP.1		
SSB Configuration for semi-static channel accessNote5,7	Config 1		SSB.1 CCA			SSB.1 CCA		
SSB Configuration for dynamic channel accessNote6,7	Config 1		SSB.2 CCA			SSB.2 CCA		
SMTC configuration			SMTC.1			SMTC.1		
EPRE ratio of PSS to SSS		dB	0			0		
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSSNote1								
EPRE ratio of OCNG to OCNG DMRSNote1								
N_{oc} Note2	Config 1	dBm/15kHz	-104			-104		
N_{oc} Note2	Config 1	dBm/SCS	-101			-101		
$\hat{E}_s/I_{ot}$		dB	17			17		
$\hat{E}_s/N_{oc}$		dB	17			17		
SS-RSRP Note3	Config 1	dBm/SCS	-84			-84		
IoNote3	Config 1	dBm/ 38.16MHz	-52.87			-52.87		
Propagation condition		-	AWGN					

Note 1:	OCNG shall be used such that resources in the cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts. OCNG is not transmitted during muted slots or during DBT windows.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.
Note 8:	As specified in clause 8.3A for $L_{1,max}$, $L_{2,1,max}$, $L_{2,2,max}$, $L_{3,1,max}$, and $L_{3,2,max}$

A.11.4.3.1.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA}$ = $T_{FirstSSB}$ + L_1*T_{rs} + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot $m + 1 + \frac{T_{HARQ}}{NR\ slot\ length}$ to slot $m + 1 + \frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB.}$

During T3, interruption on PCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.11.4.3.2 SCell Activation and Deactivation of known SCell with PCell and SCell under CCA, 320 ms SCell measurement cycle

A.11.4.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell, with PCell and SCell under CCA, are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 320 ms.

The supported test configurations are same as in Table A.11.4.3.1.1-1 above.

The test parameters are same as in Table A.11.4.3.1.1-2 above, except for parameters listed below in Table A.11.4.3.2.1-1. The cell-specific parameters are same as in Table A.11.4.3.1.1-3 above.

The test execution is the same as described in clause A.11.4.3.1 above.

Table A.11.4.3.2.1-1: General test parameters for known SCell activation with PCell and SCell under CCA, 320 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.11.4.3.2.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA}$ = $T_{FirstSSB\_MAX}$ + $L_{2,1}$*T_{SMTC_MAX} + (1 +$L_{2,2}$)*T_{rs} + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot $m + 1 + \frac{T_{HARQ}}{NR\ slot\ length}$ to slot $m + 1 + \frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB\_MAX}$ + $L_{2,1}$* T_{SMTC_MAX}.

During T3, interruption on PCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.11.4.3.3 SCell Activation and Deactivation of unknown SCell with PCell and SCell under CCA

A.11.4.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell, with PCell and SCell under CCA, are within the requirements stated in clause 8.3A, when the SCell is unknown to the UE at the time of activation.

The supported test configurations are same as in Table A.11.4.3.1.1-1 above.

The test parameters are same as in Table A.11.4.3.1.1-2 above, except for parameters listed below in Table A.11.4.3.3.1-1. The cell-specific parameters are same as in Table A.11.4.3.1.1-3 above.

The test execution is the same as described in clause A.11.4.3.1 above.

Table A.11.4.3.3.1-1: General test parameters for unknown SCell activation with PCell ans SCell under CCA

Parameter	Unit	Value	Comment
T1	s	0.1	During this time period the PCell shall be known and the SCell configured, but not detected.

A.11.4.3.3.2 Test Requirements

During T2, starting from the slot specified in clause 4.3 of TS 38.213 [3] and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

During T2, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in first available uplink resource for CSI reporting following slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA}$ = $T_{FirstSSB\_MAX}$ + (1 + $L_{3,1}$)*T_{SMTC_MAX} + (2 + $L_{3,2}$)*T_{rs} + 5ms, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n + \frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot m +1+$\frac{T_{HARQ}}{NR\ slot\ length}$ to slot m +1+$\frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB\_MAX}$ + $L_{3,1}$* T_{SMTC_MAX}.

During T3, interruption on PCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.11.4.4 Beam failure detection and link recovery procedures

A.11.4.4.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

A.11.4.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.11.4.4.1.1-1, A.11.4.4.1.1-2, A.11.4.4.1.1-3 and A.11.4.4.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.11.4.4.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.11.4.4.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA mode. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40 ms) in test 1.

Table A.11.4.4.1.1-1: Supported test configurations for FR1 PCell with CCA

Configuration	Description
1	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.11.4.4.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value		Comment
			Test 1	Test 2	
Active PSCell			Cell 1	Cell 1	
RF Channel Number			1	1	
DL CCA model			As specifieed in A.3.20.2.1	As specifieed in A.3.20.2.1	
UL CCA model			As specified in A.3.20.2.2	As specified in A.3.20.2.2	
Duplex mode	Config 1		TDD	TDD	
BWchannel	Config 1	MHz	40: NRB,c = 106	40: NRB,c = 106	
DL initial BWP configuration	Config 1		DLBWP.0.1	DLBWP.0.1	
DL dedicated BWP configuration	Config 1		DLBWP.1.1	DLBWP.1.1	
UL initial BWP configuration	Config 1		ULBWP.0.1	ULBWP.0.1	
UL dedicated BWP configuration	Config 1		ULBWP.1.1	ULBWP.1.1	
TDD Configuration	Config 1		TDDConf.1.1 CCA	TDDConf.1.1 CCA	
CORESET Reference Channel	Config 1		CR.1.1 CCA	CR.1.1 CCA	
SSB Configuration	Config 1		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	
DBT Window Configuration	Config 1		DBT.1	DBT.1	
PDSCH/PDCCH subcarrier spacing	Config 1		30 KHz	30 KHz	
PRACH Configuration	Config 1		Table A.3.8.2.2-1	Table A.3.8.2.2-1	
SSB Index assigned as BFD RS (q_0)			0	0	
SSB Index assigned as CBD RS (q_1)			1	1	
OCNG parameters			OP.1	OP.1	
CP length			Normal	Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	1-0	
	Number of Control OFDM symbols		2	2	
	Aggregation level	CCE	8	[2]	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	OFF	
Gap pattern ID			gp0	gp0	
gapOffset			0	0	
rlmInSyncOutOfSyncThreshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1	dBm/SCS kHz	-95	-95	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.2.1 TDD	CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1		TRS.1.2 TDD	TRS.1.2 TDD	
SSB Index assigned as RLM RS			0, 1	0, 1	
T310 Timer		ms	[1000]	[1000]	
N310			[2]	[2]	
T1		s	[0.2]	[0.2]	During this time the the UE shall be fully synchronized to cell 1
T2		s	[0.93]	[0.85]	
T3		s	[0.52]	[0.44]	
T4		s	[0]	[0]	
T5		s	[0.45]	[0.45]	
D1		s	[0.41]	[0.41]	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.					

Table A.11.4.4.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
DL CCA probability $P_{CCA,DL}$	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability $P_{CCA,UL}$			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5	-3	-12	-12	-12
SNR_SSB of set q_1	Config 1	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

Table A.11.4.4.1.1-4: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 2				
			T1	T2	T3	T4	T5
DL CCA probability P_{CCA}	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA}			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5	[-2]	[-4]	[-4]	[-4]
SNR_SSB of set q_1	Config 1	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

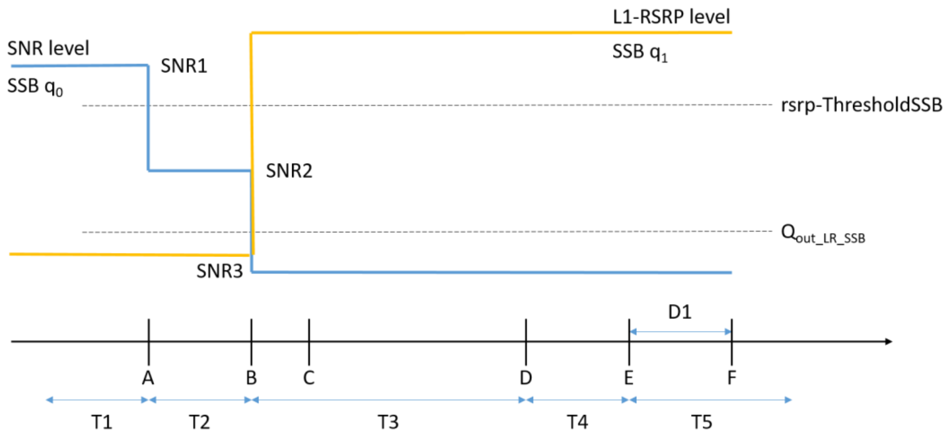

Figure A.11.4.4.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.11.4.4.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = [410] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.11.4.4.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

A.11.4.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5A.

The test parameters are given in Tables A.11.4.4.2.1-1, A.11.4.4.2.1-2, A.11.4.4.2.1-3 and A.11.4.4.2.1-4 below. There is one cell, cell 1 which is the active cell, in the test. Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.11.4.4.2.1-1 shows the variation of the downlink

SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.11.4.4.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 2 ms. The UE transmits the reporting according to UL CCA mode. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.11.4.4.2.1-1: Supported test configurations for FR1 PCell with CCA

Configuration	Description
1	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth
Note: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.11.4.4.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value		Comment
			Test 1	Test 2	
Active PSCell			Cell 1	Cell 1	
RF Channel Number			1	1	
DL CCA model			As specifieed in A.3.20.2.1	As specifieed in A.3.20.2.1	
UL CCA model			As specified in A.3.20.2.2	As specified in A.3.20.2.2	
Duplex mode	Config 1		TDD	TDD	
BWchannel	Config 1	MHz	40: NRB,c = 106	40: NRB,c = 106	
DL initial BWP configuration	Config 1		DLBWP.0.1	DLBWP.0.1	
DL dedicated BWP configuration	Config 1		DLBWP.1.1	DLBWP.1.1	
UL initial BWP configuration	Config 1		ULBWP.0.1	ULBWP.0.1	
UL dedicated BWP configuration	Config 1		ULBWP.1.1	ULBWP.1.1	
TDD Configuration	Config 1		TDDConf.1.1 CCA	TDDConf.1.1 CCA	
CORESET Reference Channel	Config 1		CR.1.1 CCA	CR.1.1 CCA	
SSB Configuration	Config 1		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access	
DBT Window Configuration	Config 1		DBT.1	DBT.1	
PDSCH/PDCCH subcarrier spacing	Config 1		30 KHz	30 KHz	
PRACH Configuration	Config 1		Table A.3.8.2.2-1	Table A.3.8.2.2-1	
SSB Index assigned as BFD RS (q_0)			0	0	
SSB Index assigned as CBD RS (q_1)			1	1	
OCNG parameters			OP.1	OP.1	
CP length			Normal	Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	2x2 Low	
Beam failure detection transmission parameters	DCI format		1-0	1-0	
	Number of Control OFDM symbols		2	2	
	Aggregation level	CCE	8	[2]	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			DRX.7	DRX.7	A.3.3.7
Gap pattern ID			N.A.	N.A.	
gapOffset			0	0	
rlmInSyncOutOfSyncThreshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1	dBm/SCS kHz	-95	-95	Threshold used for $Q_{in\_LR\_SSB}$
powerControlOffsetSS			db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount			n1	n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTimer			pbfd4	pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.2.1 TDD	CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1		TRS.1.2 TDD	TRS.1.2 TDD	
SSB Index assigned as RLM RS			0, 1	0, 1	
T310 Timer		ms	[1000]	[1000]	
N310			[2]	[2]	
T1		s	[1]	[1]	During this time the the UE shall be fully synchronized to cell 1
T2		s	[9.01]	[8.37]	
T3		s	[5.16]	[4.52]	
T4		s	[0]	[0]	
T5		s	[3.89]	[3.89]	
D1		s	[3.85]	[3.85]	
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.					

Table A.11.4.4.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
DL CCA probability P_{CCA}	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA}			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5	-3	-12	-12	-12
SNR_SSB of set q_1	Config 1	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

Table A.11.4.4.2.1-4: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 2				
			T1	T2	T3	T4	T5
DL CCA probability P_{CCA}	Note 10, 12		[1.0]	[0.9375]	[0.9375]	[0.9375]	[0.9375]
	Note 11, 12		[1.0]/[1.0]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]

UL CCA probability P_{CCA}			[1.0]	[1.0]	[1.0]	[1.0]	[1.0]
EPRE ratio of PDCCH DMRS to SSS		dB	0				
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q_0	Config 1	dB	5	[2]	[-4]	[-4]	[-4]
SNR_SSB of set q_1	Config 1	dB	-10	-10	10	10	10
SSB_RP of set q_1	Config 1	dBm/SCS kHz	-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz	-98				
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.
Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio the transmitted SSS REs during DBT window.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6A].
Note 10: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 11: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.
Note 12: For UE supporting both semi-static and dynamic cannel access, the UE can be tested under dynamic channel occupancy only.

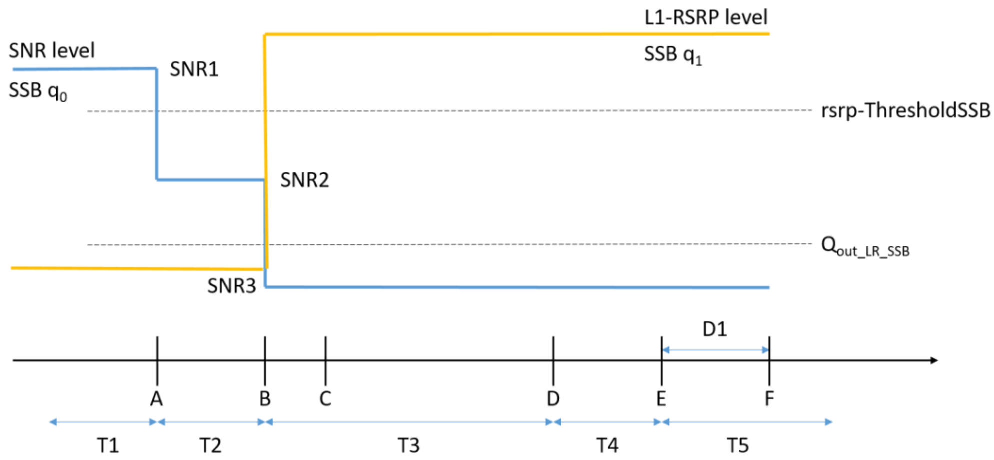

Figure A.11.4.4.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.11.4.4.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1.

No later than time point F occurring no later than D1 = [3850] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1. The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

In Test 1, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot < -7 dB.

In Test 2, the UE is verified to meet the beam failure detection for BFD-RS SSB Es/Iot ≥ -7 dB.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.11.4.5 Active BWP switching

A.11.4.5.1 UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA

A.11.4.5.1.1 Test Purpose and Environment

The purpose of this test is to verify the UL BWP switch delay requirement defined in clause 8.6.4.

The supported test configurations are shown in Table A.11.4.5.1.1-1. The test scenario comprises of one cell (Cell 1), which is Pcell as given in Table A.11.4.5.1.1-2. Cell-specific parameters of the cell are specified in Table A.11.4.5.1.1-3 below. SRS configuration used in the test is specified in Table A.11.4.5.1.1-4.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink and uplink bandwidth parts: DL BWP-1, DL BWP-2, UL BWP-1 and UL BWP-2 before starting the test. DL BWP-1 and DL BWP-2 always include bandwidth of the initial DL BWP and SSB. UL BWP-1 and UL BWP-2 always include bandwidth of the SRS.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is DL BWP-1.
- UE is indicated in *firstActiveUplinkBWP-Id* that the active UL BWP is UL BWP-1.
- UE is configured with *LBT-FailureRecoveryConfig* parameters for Cell 1.

The cell has constant signal levels throughout the test. The test consists of 2 successive time periods, with durations of T1 and T2, respectively.

During T1,

- Time period T1 starts when the UE has received the SRS configuration for periodic SRS transmission on active UL BWP-1.
- The UE shall perform UL CCA before SRS transmission.
- The parameter UL CCA probability P_{CCA} is set to 0 during T1. This requires the test system to set energy level above the detection level during portion of the UL slot where the UE performs UL CCA. This in turn forces the UE to fail the UL CCA. The UE consistently fails UL CCA during T1 and is therefore unable to transmit SRS.

During T2,

- T2 starts when the UE detects consistent UL LBT failures i.e. when total number of UL LBT failures in cell1 on active UL BWP-1 exceeds *lbt-FailureInstanceMaxCount* during *lbt-FailureDetectionTimer*.
- The UE upon detected consistent UL LBT failure starts the LBT recovery mechanism, which requires the UE to switch to active UL BWP-2 in Cell 1 and to send PRACH in the active UL BWP-2.
- Staring from T2, the UE shall be able to send PRACH in the active UL BWP-2 within the delay specified in clause 8.6.4.

Table A.11.4.5.1.1-1: Supported test configurations for UL BWP switch test in SA

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: void	

Table A.11.4.5.1.1-2: General test parameters for UL BWP switch test in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
lbt-FailureDetectionTimer [2]	ms	80	Parameter configured by IE: *LBT-FailureRecoveryConfig* [1]
lbt-FailureInstanceMaxCount [2]		4	Parameter configured by IE: *LBT-FailureRecoveryConfig* [1]
T1	s	0.1	During T1 consistent LBT failure is detected on active UL BWP-1
T2	s	0.1	During T2 UE sends PRACH on active UL BWP-2

Table A.11.4.5.1.1-3: NR Cell specific test parameters for UL BWP switch test in SA

Parameter			Unit	Cell 1	
				T1	T2
TDD configuration		Config 1		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1		40 MHz: $N_{RB,c}$ = 106	
DL CCA model		Config 1		As specified in clauseA.3.26.2.1	
UL CCA model		Config 1		As specified in clause A.3.26.2.2	
Active BWP ID		Config 1		1, 2	
Initial DL BWP Configuration		Config 1		DLBWP.0.2 Note 4	
Active DL BWP-1 Configuration		Config 1		DLBWP.1.1 Note 4	
Active DL BWP-2 Configuration		Config 1		DLBWP.1.3 Note 4	
Initial UL BWP Configuration		Config 1		ULBWP.0.2 Note 4	
Active UL BWP-1 Configuration		Config 1		ULBWP.1.1 Note 4	
Active UL BWP-2 Configuration		Config 1		ULBWP.1.3 Note 4	
PDSCH Reference measurement channel		Config 1		SR.1.1 CCA	
RMSI CORESET parameters		Config 1		CR.1.1 CCA	
Dedicated CORESET parameters		Config 1		CCR.1.3 CCA	
OCNG Patterns		Config 1		OP.1	
SSB Configuration	Semi- static channel acces	Config 1		SSB.1 CCA	
	Dymamic channel acces	Config 1		SSB.2 CCA	
SMTC Configuration		Config 1		SMTC.1 FR1	
Correlation Matrix and Antenna Configuration		Config 1		1x2 Low	
TRS Configuration		Config 1		TRS.1.2 TDD	
DL CCA probability for semi-static channel access (P_{CCA_DL})		Config 1		1	1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_1}$)		Config 1		1	1
DL CCA model probability for dynamic static channel access ($P_{CCA\_DL\_2}$)		Config 1		1	1
UL CCA probability (P_{CCA_UL})		Config 1		0	1
PRACH configuration		Config 1		N/A	Configuration #1 in Table A.3.8.2.1-1
EPRE ratio of PSS to SSS			dB	0	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note 2		Config 1	dBm/SCS	-101	
SS-RSRP Note 3		Config 1	dBm/SCS	-84	
$\hat{E}_s/I_{ot}$		Config 1	dB	17	
$\hat{E}_s/N_{oc}$		Config 1	dB	17	
Io Note3		Config 1	dBm/ 38.16MHz	-52.86	
Propagation Condition				AWGN	

Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5:	Parameters P_{CCA_DL}, $P_{CCA\_DL\_1}$, $P_{CCA\_DL\_2}$ and P_{CCA_UL} are defined in clause A.3.26.2.
Note 6:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.11.4.5.1.1-4: Sounding Reference Symbol Configuration for UL BWP Switch Test

Field	Value	Comment
c-SRS	24	Frequency hopping is disabled
b-SRS	0	
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=4 for SCS 30kHz	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting: SRS on last symbol of slot, and 1symbols for SRS without repetition.
nrofSymbols	n1	
repetitionFactor	n1	
combOffset-n2	0	transmissionComb setting
cyclicShift-n2	0	
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

A.11.4.5.1.2 Test Requirements

The UE capable of *bwp-SwitchingDelay type1* [2] shall start to transmit the PRACH on active UL BWP-2 of Cell 1 (PCell) less than 21.5 ms from the beginning of time period T1.

The UE capable of *bwp-SwitchingDelay type2* [2] shall start to transmit the PRACH on active UL BWP-2 of Cell 1 (PCell) less than 23 ms from the beginning of time period T1.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The above delay is calculated as follows:'

The active UL BWP switch delay from UL BWP-1 to UL BWP-2 can be expressed as:

$$T_{BWPswitchDelay}*T_{slot} +1*T_{slot} + (1+ L_3)*T_{SSB,RO} + 10 \text{ ms}$$

Where:

$T_{BWPswitchDelay}$ = 1 ms (2 slots) and 2.5 ms (5 slots) for *bwp-SwitchingDelay* [2] *type1* and *type2* UE capabilities according to clause 8.6.4.

T_{slot} = It is the slot length. It is 0.5 ms for 30 kHz.

L3 = It is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L3= 0 during T2 since P_{CCA} = 1.

$T_{SSB,RO}$ = 10 ms according to FR1 PRACH configuration 1.

This gives a total of 21.5 ms and 23 ms for *type1* and *type2* UE respectively.

A.11.4.5.2 DCI-based and Timer-based Active BWP Switch

A.11.4.5.2.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.11.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.11.4.5.2.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.11.4.5.2.1.1-2. NR Cell-specific parameters are specified in Table A.11.4.5.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in SCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell (Cell 1).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of PCell's slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.11.4.5.2.1.1-1: DL BWP switch supported test configurations

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: Void Note 2: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested.	

Table A.11.4.5.2.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used in this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
DL CCA model		As specified in clause A.3.26.2.1	
UL CCA model		As specified in clauseA.3.26.2.2	
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.11.4.5.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter			Unit	Cell 1	Cell2
Frequency Range				FR1	
Duplex mode		Config 1		TDD	
TDD configuration		Config 1		TDDConf.1.1 CCA	
$BW_{channel}$		Config 1		40 MHz: $N_{RB,c}$ = 106	
Active BWP ID				1, 2	0
Initial DL BWP Configuration				DLBWP.0.2 Note4	
Initial UL BWP Configuration				ULBWP.0.2 Note4	
Active DL BWP-0 Configuration				N.A.	DLBWP.0.2 Note4
Active DL BWP-1 Configuration				DLBWP.1.1 Note4	N.A.
Active DL BWP-2 Configuration				DLBWP.1.3 Note4	N.A.
Active UL BWP-0 Configuration				N.A.	ULBWP.0.2 Note4
Active UL BWP-1 Configuration				ULBWP.1.1 Note4	N.A.
Active UL BWP-2 Configuration				ULBWP.1.3 Note4	N.A.
PDSCH Reference measurement channel		Config 1		SR.1.1 CCA	
RMSI CORESET parameters		Config 1		CR.1.1 CCA	
Dedicated CORESET parameters		Config 1		CCR.1.3 CCA	
OCNG Patterns				OP.1	
SSB Configuration	Semi- static channel acces	Config 1		SSB.1 CCA	
	Dymamic channel acces	Config 1		SSB.2 CCA	
SMTC Configuration		Config 1		SMTC.1	
DL CCA probability (P_{CCA_DL})		Config 1		1	1
UL CCA probability (P_{CCA_UL})		Config 1		1	1
Correlation Matrix and Antenna Configuration				1x2 Low	
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note 2		Config 1	dBm/SCS	-101	-101
SS-RSRP Note 3		Config 1	dBm/SCS	-84	-84
$\hat{E}_s/I_{ot}$		Config 1	dB	17	17
$\hat{E}_s/N_{oc}$		Config 1	dB	17	17
Io Note3		Config 1	dBm/38.16MHz	-52.86	-52.86
Propagation Condition				AWGN	AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.11.4.5.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first DL slot that occurs after the beginning of DL slot ($i+ T_{BWPswitchDelay}+k1$), ($j+ T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.11.4.5.2.2 NR FR1 DL active BWP switch with non-DRX in SA

A.11.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.

The supported test configurations are shown in Table A.11.4.5.2.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.11.4.5.2.2.1-2. Cell-specific parameters of the cell are specified in Table A.11.4.5.2.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on Cell1's BWP-2 starting from the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on Cell1's BWP-1 starting from the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

Table A.11.4.5.2.2.1-1: DL BWP switch supported test configurations

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations. Note 2: A UE which fulfils the requirements in test case A.11.4.5.2.1 can skip the test cases in A.11.4.5.2.2. Note 3: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested.	

Table A.11.4.5.2.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
DL CCA model		As specified in clause A.3.26.2.1	
UL CCA model		As specified in clause A.3.26.2.2	
bwp-InactivityTimer	ms	200	
T1	s	0.2	
T2	s	0.2	
T3	s	0.2	

Table A.11.4.5.2.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter			Unit	Cell 1
Frequency Range				FR1
Duplex mode		Config 1		TDD
TDD configuration		Config 1		TDDConf.1.1 CCA
$BW_{channel}$		Config 1		40 MHz: $N_{RB,c}$ = 106
Active BWP ID				1, 2
Initial DL BWP Configuration		Config 1		DLBWP.0.2 Note 4
Active DL BWP-1 Configuration		Config 1		DLBWP.1.1 Note 4
Active DL BWP-2 Configuration		Config 1		DLBWP.1.3 Note 4
Initial UL BWP Configuration		Config 1		ULBWP.0.2 Note 4
Active UL BWP-1 Configuration		Config 1		ULBWP.1.1 Note 4
Active UL BWP-2 Configuration		Config 1		ULBWP.1.3 Note 4
PDSCH Reference measurement channel		Config 1		SR.1.1 CCA
RMSI CORESET parameters		Config 1		CR.1.1 CCA
Dedicated CORESET parameters		Config 1		CCR.1.3 CCA
OCNG Patterns				OP.1
SSB Configuration	Semi- static channel acces	Config 1		SSB.1 CCA
	Dymamic channel acces	Config 1		SSB.2 CCA
SMTC Configuration		Config 1		SMTC.1
Correlation Matrix and Antenna Configuration				1x2 Low
TRS Configuration		Config 1		TRS.1.2 TDD
DL CCA probability (P_{CCA_DL})		Config 1		1
UL CCA probability (P_{CCA_UL})		Config 1		1
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note 2		Config 1	dBm/SCS	-101
SS-RSRP Note 3		Config 1	dBm/SCS	-84
$\hat{E}_s/I_{ot}$		Config 1	dB	17
$\hat{E}_s/N_{oc}$		Config 1	dB	17
Io Note3		Config 1	dBm/38.16 MHz	-52.86
Propagation Condition				AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.11.4.5.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$).

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot ($j+T_{BWPswitchDelay}+k1$).

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot ($i+T_{BWPswitchDelay}+k1$), ($j+T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.11.4.5.3 RRC-based Active BWP Switch

A.11.4.5.3.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.11.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.

The supported test configurations are shown in Table A.11.4.5.3.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.11.4.5.3.1.1-2. Cell-specific parameters of Cell are specified in Table A.11.4.5.3.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in Cell 1.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $\mathrm{i}+\frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $\mathrm{i}+\frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}+\mathrm{k1}$ on BWP-1 of final condition. The UE shall be continuously scheduled on PCell's BWP-1 of final condition starting from the first DL slot right after slot $\mathrm{i}+\frac{T_{\mathrm{RRCprocessingDelay}}+T_{\mathrm{BWPswitchDelayRRC}}}{\mathrm{NR\ Slot\ length}}$.

$T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in Cell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received is received.

Table A.11.4.5.3.1.1-1: DL BWP switch supported test configurations in SA scenario

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: Void Note 2: The UE supporting SA operation with only NR band(s) with shared spectrum access is required to be tested.	

Table A.11.4.5.3.1.1-2: General test parameters for DL BWP switch in SA scenario

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DL CCA model		As specified in clause A.3.26.2.1	
UL CCA model		As specified in clause A.3.26.2.2	
DRX		OFF	
T1	s	0.2	

Table A.11.4.5.3.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario

Parameter				Unit	Cell 1
Frequency Range					FR1
Duplex mode			Config 1		TDD
TDD configuration			Config 1		TDDConf.1.1 CCA
$BW_{channel}$			Config 1		40 MHz: $N_{RB,c}$ = 106
Active BWP ID					1
Initial DL BWP Configuration			Config 1		DLBWP.0.2
Initial UL BWP Configuration			Config 1		ULBWP.0.2
Initial Condition	Active DL BWP-1 Configuration		Config 1		DLBWP.1.3
	Active UL BWP-1 Configuration		Config 1		ULBWP.1.3
Final Condition	Active DL BWP-1 Configuration		Config 1		DLBWP.1.1
	Active UL BWP-1 Configuration		Config 1		ULBWP.1.1
PDSCH Reference measurement channel			Config 1		SR.1.1 CCA
RMSI CORESET parameters			Config 1		CR.1.1 CCA
Dedicated CORESET parameters			Config 1		CCR.1.3 CCA
OCNG Patterns					OP.1
SSB Configuration		Semi-static channel acces	Config 1		SSB.1 CCA
		Dymamic channel acces	Config 1		SSB.2 CCA
SMTC Configuration					SMTC.1
TRS Configuration			Config 1		TRS.1.2 TDD
DL CCA probability (P_{CCA_DL})			Config 1		1
UL CCA probability (P_{CCA_UL})			Config 1		1
Propagation Condition					AWGN
EPRE ratio of PSS to SSS				dB	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} Note 2			Config 1	dBm/SCS	-101
SS-RSRP Note 3			Config 1	dBm/SCS	-84
$\hat{E}_s/I_{ot}$			Config 1	dB	17
$\hat{E}_s/N_{oc}$			Config 1	dB	17
Io Note3			Config 1	dBm/38.16MHz	-52.86

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.11.4.5.3.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the Cell from the first DL slot that occurs right after the begining of slot $i + \frac{T_{\text{RRCprocessingDelay}} + T_{\text{BWPswitchDelayRRC}}}{\text{NR Slot length}}$ and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{\text{RRCprocessingDelay}} + T_{\text{BWPswitchDelayRRC}}}{\text{NR Slot length}} + \text{k1}$.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.11.4.6 Active TCI state switching delay

A.11.5 Measurement procedure

A.11.5.1 Intra-frequency measurements

A.11.5.1.1 Event-triggered reporting tests on PCC without gaps under non-DRX

A.11.5.1.1.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.11.5.1.1.2 Test parameters

Two cells are deployed in the test, which are PCell (Cell 1) and a neighbour cell (Cell 2) on the same carrier frequency with CCA transmitting SSBs in DBT windows according to DL CCA model. The test parameters for the two cells are given in Table A.11.5.1.1.2-1 and A.11.5.1.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
- In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
- In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.11.5.1.1.2-1: Supported test configurations

Configuration	Description
1	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.5.1.1.2-2: General test parameters for intra-frequency event triggered reporting without gaps

Editor's note: Table TBD

Table A.11.5.1.1.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

Editor's note: Table TBD

A.11.5.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.2 Event-triggered reporting tests on PCC without gaps under DRX

A.11.5.1.2.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.11.5.1.2.2 Test parameters

A.11.5.1.2.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.3 Event-triggered reporting tests on PCC with per-UE gaps under non-DRX

A.11.5.1.3.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.11.5.1.3.2 Test parameters

A.11.5.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTI$_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.4 Event-triggered reporting tests on PCC with per-UE gaps under DRX

A.11.5.1.4.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.11.5.1.4.2 Test parameters

A.11.5.1.4.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTI$_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.5 Event-triggered reporting tests on SCC without gaps under non-DRX

A.11.5.1.5.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.11.5.1.5.2 Test parameters

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.6 Event-triggered reporting tests on SCC without gaps under DRX

A.11.5.1.6.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.11.5.1.6.2 Test parameters

A.11.5.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.7 Event-triggered reporting tests on SCC with per-UE gaps under non-DRX

A.11.5.1.7.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.11.5.1.7.2 Test parameters

A.11.5.1.7.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.8 Event-triggered reporting tests on SCC with per-UE gaps under DRX

A.11.5.1.8.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.11.5.1.8.2 Test parameters

A.11.5.1.8.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.1.9 RSSI measurement reporting on PCC

A.11.5.1.9.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

A.11.5.1.9.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.9.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1.

Table A.11.5.1.9.2-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.5.1.9.2-2: General test parameters.

Editor’s note: Table TBD

A.11.5.1.10 Channel occupancy measurement reporting on PCC

A.11.5.1.10.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

A.11.5.1.10.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.10.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1.

Table A.11.5.1.10.2-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.5.1.10.2-2: General test parameters.

Editor’s note: Table is TBD

A.11.5.1.11 RSSI measurement reporting on SCC

A.11.5.1.11.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

A.11.5.1.11.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.11.2-1. There are two cells in the test: Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.11.5.1.11.2-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.5.1.11.2-2: General test parameters.

Editor's note: Tabls TBD

A.11.5.1.12 Channel occupancy measurement reporting on SCC

A.11.5.1.12.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

A.11.5.1.12.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.1.12.2-1. There are two cells in the test: Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.11.5.1.12.2-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.5.1.12.2-2: General test parameters.

Editor's note: Table is TBD

A.11.5.2 Inter-frequency measurements

A.11.5.2.1 RSSI measurement reporting

A.11.5.2.1.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 9.3A.8.

A.11.5.2.1.2 Test parameters

In the test, the UE is configured to perform inter-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.2.1.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1. The RSSI measurement is performed on an inter-frequency under CCA.

Table A.11.5.2.1.2-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.5.2.1.2-2: General test parameters.

Editor’s note: Table TBD

A.11.5.2.2 Channel occupancy measurement reporting

A.11.5.2.2.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency channel occupancy measurement reporting requirements in Section 9.3A.9.

A.11.5.2.2.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.11.5.2.2.2-1. There is one cell in the test: Cell 1 which is PCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1. The channel occupancy measurement is performed on an inter-frequency under CCA.

Table A.11.5.2.2.2-1: Supported test configurations.

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.5.2.2.2-2: General test parameters.

Editor’s note: Table is TBD

A.11.5.2.3 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is not used

A.11.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA in clause 9.3A.4 and 9.3A.5.

In this test, there are two cells: NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 with CCA on NR RF channel 2. The test parameters are given in Tables A.11.5.2.3.1-1, A.11.5.2.3.1-2 and A.11.5.2.3.1-3.

In test 1, measurement gap pattern configuration # 0 as defined in Table A.11.5.2.3.1-2 is provided for UE that does not support per-FR gap. In test 2, measurement gap pattern configuration #4 as defined in Table A.11.5.2.3.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.11.5.2.3.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cells		Config 1	NR cell 1 with CCA (PCell)		NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1	NR cell 2 with CCA		NR cell 2 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1	As specified in clause A.3.20.2.1		
UL CCA model		Config 1	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	9	9	
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	s	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3µs		Synchronous cells.
T1	s	Config 1	[5]		
T2	s	Config 1	[1]	[1]	

Table A.11.5.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number			Config 1	1		2	
Duplex mode			Config 1	TDD			
TDD configuration			Config 1	TDDConf.1.1 CCA			
$BW_{channel}$		MHz	Config 1	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP	Config 1	Config 1	DLBWP.0.1		NA	
	Initial UL BWP	Config 1		ULBWP.0.1		NA	
	Dedicated DL BWP	Config 1		DLBWP.1.1		NA	
	Dedicated UL BWP	Config 1		ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 CCA			
CORESET Reference Channel			Config 1	CR.1.1 CCA			
SSB parameters	Semi-static channel access Note 5,7		Config 1	SSB.1 CCA		SSB.1 CCA	
	Dynamic channel access Note 6,7		Config 1	SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1	As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration defined in A.3.11			Config 1	SMTC.1		SMTC.4	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1	TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1	TBD		TBD	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	30			
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz	Config 1	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.						

A.11.5.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.2.4 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is used

A.11.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.4.1-1, A.11.5.2.4.1-2 and A.11.5.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.4.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1	1, 2				Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cells		Config 1	NR cell 1 with CCA (PCell)				NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1	NR cell 2 with CCA				NR cell 2 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1	As specified in clause A.3.20.2.1				
UL CCA model		Config 1	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	9		9		
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Normal				
TimeToTrigger	s	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs				Synchronous cells.
T1	s	Config 1	[5]				
T2	s	Config 1	[1.1]	[11]	[1.1]	[11]	

Table A.11.5.2.4.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

<table>
<tr><th colspan="2" rowspan="2">Parameter</th><th rowspan="2">Unit</th><th rowspan="2">Test configuration</th><th colspan="4">Cell 1</th><th colspan="4">Cell 2</th></tr>
<tr><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th></tr>
<tr><td colspan="2">NR RF Channel Number</td><td></td><td>Config 1</td><td colspan="4">1</td><td colspan="4">2</td></tr>
<tr><td colspan="2">Duplex mode</td><td></td><td>Config 1</td><td colspan="8">TDD</td></tr>
<tr><td colspan="2">TDD configuration</td><td></td><td>Config 1</td><td colspan="8">TDDConf.1.1 CCA</td></tr>
<tr><td colspan="2">$BW_{channel}$</td><td>MHz</td><td>Config 1</td><td colspan="8">40: $N_{RB,c}$ = 106</td></tr>
<tr><td colspan="2">BWP BW</td><td>MHz</td><td>Config 1</td><td colspan="8">40: $N_{RB,c}$ = 106</td></tr>
<tr><td rowspan="4">BWP configuration</td><td>Initial DL BWP</td><td>Config 1</td><td rowspan="4">Config 1</td><td colspan="4">DLBWP.0.1</td><td colspan="4">NA</td></tr>
<tr><td>Initial UL BWP</td><td>Config 1</td><td colspan="4">ULBWP.0.1</td><td colspan="4">NA</td></tr>
<tr><td>Dedicated DL BWP</td><td>Config 1</td><td colspan="4">DLBWP.1.1</td><td colspan="4">NA</td></tr>
<tr><td>Dedicated UL BWP</td><td>Config 1</td><td colspan="4">ULBWP.1.1</td><td colspan="4">NA</td></tr>
<tr><td colspan="2">TRS configuration</td><td></td><td>Config 1</td><td colspan="4">TRS.1.2 TDD</td><td colspan="4">NA</td></tr>
<tr><td colspan="2">OCNG Patterns defined in A.3.2.1.1 (OP.1)</td><td></td><td>Config 1</td><td colspan="4">OP.1</td><td colspan="4">OP.1</td></tr>
<tr><td colspan="2">PDSCH Reference measurement channel</td><td></td><td>Config 1</td><td colspan="4">SR.1.1 CCA</td><td colspan="4"></td></tr>
<tr><td colspan="2">CORESET Reference Channel</td><td></td><td>Config 1</td><td colspan="4">CR.1.1 CCA</td><td colspan="4"></td></tr>
<tr><td rowspan="2">SSB parameters</td><td>Semi-static channel access Note 5,7</td><td></td><td>Config 1</td><td colspan="4">SSB.1 CCA</td><td colspan="4">SSB.1 CCA</td></tr>
<tr><td>Dynamic channel access Note 6,7</td><td></td><td>Config 1</td><td colspan="4">SSB.2 CCA</td><td colspan="4">SSB.2 CCA</td></tr>
<tr><td colspan="2">DBT window configuration</td><td></td><td>Config 1</td><td colspan="4">As defined in A.3.28.1</td><td colspan="4">As defined in A.3.28.1</td></tr>
<tr><td colspan="2">SMTC configuration defined in A.3.11</td><td></td><td>Config 1</td><td colspan="4">SMTC.1</td><td colspan="4">SMTC.4</td></tr>
<tr><td rowspan="2">DL CCA probability P_{CCA_DL}</td><td>Semi-static channel access Note 5,7</td><td></td><td>Config 1</td><td colspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td>Dynamic channel access Note 6,7</td><td></td><td>Config 1</td><td colspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td rowspan="2">UL CCA probability P_{CCA_UL}</td><td>Semi-static channel access Note 5,7</td><td></td><td>Config 1</td><td colspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td>Dynamic channel access Note 6,7</td><td></td><td>Config 1</td><td colspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td colspan="2">PDSCH/PDCCH subcarrier spacing</td><td>kHz</td><td>Config 1</td><td colspan="8">30</td></tr>
<tr><td colspan="2">EPRE ratio of PSS to SSS</td><td></td><td rowspan="4">Config 1</td><td colspan="4" rowspan="4">0</td><td colspan="4" rowspan="4">0</td></tr>
<tr><td colspan="2">EPRE ratio of PBCH DMRS to SSS</td><td></td></tr>
<tr><td colspan="2">EPRE ratio of PBCH to PBCH DMRS</td><td></td></tr>
<tr><td colspan="2">EPRE ratio of PDCCH DMRS to SSS</td><td></td></tr>
</table>

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz	Config 1	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.11.5.2.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.11.5.2.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.11.5.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.2.5 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is not used

A.11.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.5.1-1, A.11.5.2.5.1-2 and A.11.5.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.11.5.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.11.5.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cells		Config 1	NR cell 1 with CCA (PCell)		NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1	NR cell 2 with CCA		NR cell 2 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1	As specified in clause A.3.20.2.1		
UL CCA model		Config 1	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	9	9	
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	s	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	s	Config 1	[5]		
T2	s	Config 1	[1]	[1]	

Table A.11.5.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number			Config 1	1		2	
Duplex mode			Config 1	TDD			
TDD configuration			Config 1	TDDConf.1.1 CCA			
$BW_{channel}$		MHz	Config 1	40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1	40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP	Config 1	Config 1	DLBWP.0.1		NA	
	Initial UL BWP	Config 1		ULBWP.0.1		NA	
	Dedicated DL BWP	Config 1		DLBWP.1.1		NA	
	Dedicated UL BWP	Config 1		ULBWP.1.1		NA	
TRS configuration			Config 1	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 CCA			
CORESET Reference Channel			Config 1	CR.1.1 CCA			
SSB parameters	Semi-static channel access Note 5,7		Config 1	SSB.1 CCA		SSB.1 CCA	
	Semi-static channel access Note 5,7		Config 1	SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1	As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration defined in A.3.11			Config 1	SMTC.1		SMTC.4	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1	TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1	TBD		TBD	
	Dynamic channel access Note 6,7		Config 1	TBD		TBD	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	30			
EPRE ratio of PSS to SSS			Config 1	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz	Config 1	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.11.5.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.2.6 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is used

A.11.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.6.1-1, A.11.5.2.6.1-2 and A.11.5.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1	1, 2				Two FR1 NR carrier frequencies are used. Channels 1 and 2 are with CCA.
Active cells		Config 1	NR cell 1 with CCA (PCell)				NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1	NR cell 2 with CCA				NR cell 2 is on NR RF channel number 2 with CCA.
DL CCA model		Config 1	As specified in clause A.3.20.2.1				
UL CCA model		Config 1	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	9		9		
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Normal				
TimeToTrigger	s	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs				Synchronous cells.
T1	s	Config 1	[5]				
T2	s	Config 1	[1.1]	[11]	[1.1]	[11]	

Table A.11.5.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter		Unit	Test configuration	Cell 1				Cell 2			
				T1	T2	T3	T4	T1	T2	T3	T4
NR RF Channel Number			Config 1	1				2			
Duplex mode			Config 1	TDD							
TDD configuration			Config 1	TDDConf.1.1 CCA							
$BW_{channel}$		MHz	Config 1	40: $N_{RB,c}$ = 106							
BWP BW		MHz	Config 1	40: $N_{RB,c}$ = 106							
BWP configuration	Initial DL BWP	Config 1	Config 1	DLBWP.0.1				NA			
	Initial UL BWP	Config 1		ULBWP.0.1				NA			
	Dedicated DL BWP	Config 1		DLBWP.1.1				NA			
	Dedicated UL BWP	Config 1		ULBWP.1.1				NA			
TRS configuration			Config 1	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1	OP.1				OP.1			
PDSCH Reference measurement channel			Config 1	SR.1.1 CCA							
CORESET Reference Channel			Config 1	CR.1.1 CCA							
SSB parameters	Semi-static channel access Note 5,7		Config 1	SSB.1 CCA				SSB.1 CCA			
	Semi-static channel access Note 5,7		Config 1	SSB.2 CCA				SSB.2 CCA			
DBT window configuration			Config 1	As defined in A.3.28.1				As defined in A.3.28.1			
SMTC configuration defined in A.3.11			Config 1	SMTC.1				SMTC.4			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1	TBD				TBD			
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1	TBD				TBD			
	Dynamic channel access Note 6,7		Config 1	TBD				TBD			
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	30							
EPRE ratio of PSS to SSS			Config 1	0				0			
EPRE ratio of PBCH DMRS to SSS											
EPRE ratio of PBCH to PBCH DMRS											
EPRE ratio of PDCCH DMRS to SSS											

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz	Config 1	[-101]		[-101]	
N_{oc} Note2	dBm/SCS	Config 1	[-101]		[-101]	
SS-RSRP Note 3	dBm/SCS	Config 1	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.

Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.

Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.11.5.2.6.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.11.5.2.6.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.11.5.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of

A.11.5.2.7 Event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.11.5.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA in clause 9.3A.4 and 9.3A.5.

In this test, there are two cells: NR cell 1 with CCA as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.11.5.2.7.1-1, A.11.5.2.7.1-2 and A.11.5.2.7.1-3.

In test 1, measurement gap pattern configuration # 0 as defined in Table A.11.5.2.7.1-2 is provided for UE that does not support per-FR gap. In test 2, measurement gap pattern configuration #4 as defined in Table A.11.5.2.7.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.11.5.2.7.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA.
Active cell		Config 1,2,3	NR cell 1 (PCell)		NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1,2,3	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 1,2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	1	1	

Table A.11.5.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 2 T1	Cell 2 T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	TDD		FDD	
			Config 2,3	TDD		TDD	
TDD configuration			Config 1	TDDConf.1.1 CCA		Not Applicable	
			Config 2	TDDConf.1.1 CCA		TDDConf.1.1	
			Config 3	TDDConf.1.1 CCA		TDDConf.2.1	
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1,2,3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1,2,3	SR.1.1 CCA			
CORESET Reference Channel			Config 1,2,3	CR.1.1 CCA			
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA		SSB.1 FR1	
			Config 3	SSB.1 CCA		SSB.2 FR1	
	Semi-static channel access Note 5,7		Config 1,2	SSB.2 CCA		SSB.1 FR1	
			Config 3	SSB.2 CCA		SSB.2 FR1	
DBT window configuration			Config 1,2,3	As defined in A.3.28.1		Not applicable	
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	30		15	
			Config 3	30		30	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD		NA	
	Dynamic channel access Note 6,7		Config 1,2,3	TBD		NA	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD		NA	
	Dynamic channel access Note 6,7		Config 1,2,3	TBD		NA	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2,3	[-101]		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		-98	
		Config 3	[-101]		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-58.49	-58.49	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.11.5.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.2.8 Event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.11.5.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.8.1-1, A.11.5.2.8.1-2 and A.11.5.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.8.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.8.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.8.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2				Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA.
Active cell		Config 1,2,3	NR cell 1 (PCell)				NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3	NR cell 2				NR cell 2 is on NR RF channel number 2.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9		9		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between serving and neighbour cells		Config 1,2,3	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 1,2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	[1.1]	[11]	[1.1]	[11]	

Table A.11.5.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter		Unit	Test configuration	Cell 1				Cell 2			
				T1	T2	T3	T4	T1	T2	T3	T4
NR RF Channel Number			Config 1,2,3	1				2			
Duplex mode			Config 1	TDD				FDD			
			Config 2,3	TDD				TDD			
TDD configuration			Config 1	TDDConf.1.1 CCA				Not Applicable			
			Config 2	TDDConf.1.1 CCA				TDDConf.1.1			
			Config 3	TDDConf.1.1 CCA				TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1				NA			
	Initial UL BWP			ULBWP.0.1				NA			
	Dedicated DL BWP			DLBWP.1.1				NA			
	Dedicated UL BWP			ULBWP.1.1				NA			
TRS configuration			Config 1,2,3	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1				OP.1			
PDSCH Reference measurement channel			Config 1,2,3	SR.1.1 CCA							
CORESET Reference Channel			Config 1,2,3	CR.1.1 CCA							
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA				SSB.1 FR1			
			Config 3	SSB.1 CCA				SSB.2 FR1			
	Semi-static channel access Note 5,7		Config 1,2	SSB.2 CCA				SSB.1 FR1			
			Config 3	SSB.2 CCA				SSB.2 FR1			
DBT window configuration			Config 1,2,3	As defined in A.3.28.1				Not applicable			
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1				SMTC.4			
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	30				15			
			Config 3	30				30			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD				NA			
	Dynamic channel access Note 6,7		Config 1,2,3	TBD				NA			
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD				NA			
	Dynamic channel access Note 6,7		Config 1,2,3	TBD				NA			
EPRE ratio of PSS to SSS			Config 1,2,3	0				0			
EPRE ratio of PBCH DMRS to SSS											
EPRE ratio of PBCH to PBCH DMRS											
EPRE ratio of PDCCH DMRS to SSS											

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2,3	[-101]		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		-98	
		Config 3	[-101]		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-58.49	-58.49	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.11.5.2.8.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.11.5.2.8.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.11.5.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.2.9 Event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.11.5.2.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.9.1-1, A.11.5.2.9.1-2 and A.11.5.2.9.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.9.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.11.5.2.9.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.11.5.2.9.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.9.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA.
Active cell		Config 1,2,3	NR cell 1 (PCell)		NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1,2,3	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 1,2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	1	1	

Table A.11.5.2.9.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2	
				T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2	
Duplex mode			Config 1	TDD		FDD	
			Config 2,3	TDD		TDD	
TDD configuration			Config 1	TDDConf.1.1 CCA		Not Applicable	
			Config 2	TDDConf.1.1 CCA		TDDConf.1.1	
			Config 3	TDDConf.1.1 CCA		TDDConf.2.1	
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106		10: $N_{RB,c}$ = 52	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		NA	
	Initial UL BWP			ULBWP.0.1		NA	
	Dedicated DL BWP			DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1		NA	
TRS configuration			Config 1,2,3	TRS.1.2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Reference measurement channel			Config 1,2,3	SR.1.1 CCA			
CORESET Reference Channel			Config 1,2,3	CR.1.1 CCA			
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA		SSB.1 FR1	
			Config 3	SSB.1 CCA		SSB.2 FR1	
	Semi-static channel access Note 5,7		Config 1,2	SSB.2 CCA		SSB.1 FR1	
			Config 3	SSB.2 CCA		SSB.2 FR1	
DBT window configuration			Config 1,2,3	As defined in A.3.28.1		Not applicable	
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	30		15	
			Config 3	30		30	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD		NA	
	Dynamic channel access Note 6,7		Config 1,2,3	TBD		NA	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD		NA	
	Dynamic channel access Note 6,7		Config 1,2,3	TBD		NA	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2,3	[-101]		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		-98	
		Config 3	[-101]		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-58.49	-58.49	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.11.5.2.9.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.2.10 Event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.11.5.2.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.11.5.2.10.1-1, A.11.5.2.10.1-2 and A.11.5.2.10.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.11.5.2.10.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.11.5.2.10.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.11.5.2.10.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.11.5.2.10.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2				Two FR1 NR carrier frequencies are used. NR channel 1 is with CCA.
Active cell		Config 1,2,3	NR cell 1 (PCell)				NR cell 1 is on NR RF channel number 1 with CCA.
Neighbour cell		Config 1,2,3	NR cell 2				NR cell 2 is on NR RF channel number 2.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9		9		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX.2	DRX.1	DRX.2	DRX is not used
Time offset between serving and neighbour cells		Config 1,2,3	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 1,2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	[1.1]	[11]	[1.1]	[11]	

Table A.11.5.2.10.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter		Unit	Test configuration	Cell 1 T1	Cell 1 T2	Cell 1 T3	Cell 1 T4	Cell 2 T1	Cell 2 T2	Cell 2 T3	Cell 2 T4
NR RF Channel Number			Config 1,2,3	1				2			
Duplex mode			Config 1	TDD				FDD			
			Config 2,3	TDD				TDD			
TDD configuration			Config 1	TDDConf.1.1 CCA				Not Applicable			
			Config 2	TDDConf.1.1 CCA				TDDConf.1.1			
			Config 3	TDDConf.1.1 CCA				TDDConf.2.1			
$BW_{channel}$		MHz	Config 1,2	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
BWP BW		MHz	Config 1,2	40: $N_{RB,c}$ = 106				10: $N_{RB,c}$ = 52			
			Config 3	40: $N_{RB,c}$ = 106				40: $N_{RB,c}$ = 106			
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1				NA			
	Initial UL BWP			ULBWP.0.1				NA			
	Dedicated DL BWP			DLBWP.1.1				NA			
	Dedicated UL BWP			ULBWP.1.1				NA			
TRS configuration			Config 1,2,3	TRS.1.2 TDD				NA			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1				OP.1			
PDSCH Reference measurement channel			Config 1,2,3	SR.1.1 CCA							
CORESET Reference Channel			Config 1,2,3	CR.1.1 CCA							
SSB parameters	Semi-static channel access Note 5,7		Config 1,2	SSB.1 CCA				SSB.1 FR1			
			Config 3	SSB.1 CCA				SSB.2 FR1			
	Semi-static channel access Note 5,7		Config 1,2	SSB.2 CCA				SSB.1 FR1			
			Config 3	SSB.2 CCA				SSB.2 FR1			
DBT window configuration			Config 1,2,3	As defined in A.3.28.1				Not applicable			
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1				SMTC.4			
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	30				15			
			Config 3	30				30			
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD				NA			
	Dynamic channel access Note 6,7		Config 1,2,3	TBD				NA			
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	TBD				NA			
	Dynamic channel access Note 6,7		Config 1,2,3	TBD				NA			
EPRE ratio of PSS to SSS			Config 1,2,3	0				0			
EPRE ratio of PBCH DMRS to SSS											
EPRE ratio of PBCH to PBCH DMRS											
EPRE ratio of PDCCH DMRS to SSS											

EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15kHz	Config 1,2,3	[-101]		-98	
N_{oc} Note2	dBm/SCS	Config 1,2	[-101]		-98	
		Config 3	[-101]		-95	
SS-RSRP Note 3	dBm/SCS	Config 1,2	-91	-91	-Infinity	-91
		Config 3	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io Note3	dBm/9.36MHz	Config 1,2	-58.49	-58.49	-70.05	-62.26
	dBm/38.16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 7: For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.						

Table A.11.5.2.10.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.11.5.2.10.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.11.5.2.10.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.3 Inter-RAT E-UTRAN measurements

A.11.5.4 L1-RSRP measurements for beam reporting

A.11.5.4.1 SSB based L1-RSRP measurement when DRX is not used

A.11.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.1.1-1.

Table A.11.5.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.11.5.4.1.2 Test parameters

There is one cell in the test, the FR1 PCell (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.1.2-1 and Table A.11.5.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
DL CCA model	1		As specifieed in A.3.20.2.1
UL CCA model	1		As specified in A.3.20.2.2
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.1.1 CCA
$BW_{channel}$	1	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 CCA
RMSI CORESET Reference Channel	1		CR.1.1 CCA
Dedicated CORESET Reference Channel	1		CCR.1.1 CCA
SSB configuration	1		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1		DBT.1
TRS Configuration	1		TRS.1.2 TDD
DRX configuration	1		Off
reportConfigType	1		periodic
reportQuantity	1		ssb-Index-RSRP
Number of reported RS	1		2
L1-RSRP reporting period	1	slot	80
T1	1	s	5
T2	1	s	1
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1		AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.			

Table A.11.5.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1	dBm/15kHz	-94.65			
N_{oc} Note2	1	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1	dB	0	0	-Infinity	3
SSB RSRP Note3	1	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.11.5.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.4.2 SSB based L1-RSRP measurement when DRX is used

A.11.5.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.2.1-1.

Table A.11.5.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.11.5.4.2.2 Test parameters

There is one cell in the test, the FR1 PCell (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.2.2-1 and Table A.11.5.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
DL CCA model	1		As specifieed in A.3.20.2.1
UL CCA model	1		As specified in A.3.20.2.2
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.1.1 CCA
$BW_{channel}$	1	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 CCA
RMSI CORESET Reference Channel	1		CR.1.1 CCA
Dedicated CORESET Reference Channel	1		CCR.1.1 CCA
SSB configuration	1		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1		DBT.1
TRS Configuration	1		TRS.1.2 TDD
DRX configuration	1		DRX.3
reportConfigType	1		periodic
reportQuantity	1		ssb-Index-RSRP
Number of reported RS	1		2
L1-RSRP reporting period	1	slot	80
T1	1	s	5
T2	1	s	1
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1		AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.			

Table A.11.5.4.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1	dBm/15kHz	-94.65			
N_{oc} Note2	1	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1	dB	0	0	-Infinity	3
SSB RSRP Note3	1	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.11.5.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.4.3 SSB based L1-RSRP measurement on SCC when DRX is not used

A.11.5.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.3.1-1.

Table A.11.5.4.3.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.11.5.4.3.2 Test parameters

There are two cells in the test, the FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Both Cell 1 and Cell 2 operate on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.3.2-1 and Table A.11.5.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
Active PCell	1		Cell 1
Active SCell	1		Cell 2
RF Channel Number	1		1: Cell 1 2: Cell 2
DL CCA model	1		As specifieed in A.3.20.2.1
UL CCA model	1		As specified in A.3.20.2.2
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.1.1 CCA
$BW_{channel}$	1	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 CCA
RMSI CORESET Reference Channel	1		CR.1.1 CCA
Dedicated CORESET Reference Channel	1		CCR.1.1 CCA
SSB configuration	1		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1		DBT.1
TRS Configuration	1		TRS.1.2 TDD
DRX configuration	1		Off
reportConfigType	1		periodic
reportQuantity	1		ssb-Index-RSRP
Number of reported RS	1		2
L1-RSRP reporting period	1	slot	80
T1	1	s	5
T2	1	s	1
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS Note 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1		AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the			

slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.

Table A.11.5.4.3.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1	dBm/15kHz	-94.65			
N_{oc} Note2	1	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1	dB	0	0	-Infinity	3
SSB RSRP Note3	1	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1	dB	0	0	-Infinity	3
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy. Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.						

A.11.5.4.3.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.5.4.4 SSB based L1-RSRP measurement on SCC when DRX is used

A.11.5.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.11.5.4.4.1-1.

Table A.11.5.4.4.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.11.5.4.4.2 Test parameters

There are two cells in the test, the FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Both Cell 1 and Cell 2 operate on a carrier frequency with CCA and transmits SSBs in DBT windows according to DL CCA model. The test parameters for the Cell 1 are given in Table A.11.5.4.4.2-1 and Table A.11.5.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.11.5.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
Active PCell	1		Cell 1
Active SCell	1		Cell 2
RF Channel Number	1		1: Cell 1 2: Cell 2
DL CCA model	1		As specifieed in A.3.20.2.1
UL CCA model	1		As specified in A.3.20.2.2
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.1.1 CCA
$BW_{channel}$	1	MHz	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel	1		SR.1.1 CCA
RMSI CORESET Reference Channel	1		CR.1.1 CCA
Dedicated CORESET Reference Channel	1		CCR.1.1 CCA
SSB configuration	1		SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
DBT Window Configuration	1		DBT.1
TRS Configuration	1		TRS.1.2 TDD
DRX configuration	1		DRX.3
reportConfigType	1		periodic
reportQuantity	1		ssb-Index-RSRP
Number of reported RS	1		2
L1-RSRP reporting period	1	slot	80
T1	1	s	5
T2	1	s	1
EPRE ratio of PSS to SSS	1	dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS[Note 1]			
EPRE ratio of OCNG to OCNG DMRS [Note 1]			
Propagation condition	1		AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the			

slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.

Table A.11.5.4.4.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1	dBm/15kHz	-94.65			
N_{oc} Note2	1	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1	dB	0	0	-Infinity	3
SSB RSRP Note3	1	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1	dB	0	0	-Infinity	3
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy. Note 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows. Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.						

A.11.5.4.4.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.11.6 Measurement performance

A.11.6.1 SS-RSRP

A.11.6.1.1 Intra-frequency measurement accuracy on a carrier frequency with CCA

A.11.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 10.1.36.1.1 and 10.1.36.1.2 for intra-frequency measurements under CCA.

A.11.6.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model. Supported test configurations are shown in table A.11.6.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.11.6.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.11.6.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.6.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

Cell ID				489	0	489	0	489	0
SSB ARFCN				freq1		freq1		freq1	
TDD configuration	Config 1			TDDConf.1.1 CCA					
$BW_{channel}$	Config 1		MHz	40: $N_{RB,c}$ = 106					
BWP BW	Config 1			40: $N_{RB,c}$ = 106					
DL CCA model				As specified in clause A.3.20.2.1					
UL CCA model				As specified in clause A.3.20.2.2					
P_{CCA_DL}				[TBD]					
P_{CCA_UL}				[TBD]					
Downlink initial BWP configuration				DLBWP.0.1					
Downlink dedicated BWP configuration				DLBWP.1.1					
Uplink initial BWP configuration				ULBWP.0.1					
Uplink dedicated BWP configuration				ULBWP.1.1					
TRS configuration	Config 1			TRS.1.2 TDD	NA	TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle			ms	Not Applicable					
PDSCH Reference measurement channel	Config 1			SR.1.1 CCA	-	SR.1.1 CCA	-	SR.1.1 CCA	-
RMSI CORESET Reference Channel	Config 1			CR.1.1 CCA	-	CR.1.1 CCA	-	CR.1.1 CCA	-
Control channel RMC	Config 1			CR.1.1 CCA	-	CR.1.1 CCA	-	CR.1.1 CCA	-
SSB configuration for semi-static channel access	Config 1			SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA
SSB configuration for dynamic channel access	Config 1			SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA
DBT window configuration	Config 1,2,3			DBT.1	DBT.1	DBT.1	DBT.1	DBT.1	DBT.1
Time offset with Cell 1	Config 1		µs	-	3	-	3	-	3
SMTC configuration	Config 1			SMTC.1					
OCNG Patterns				OCNG pattern 1					
PDSCH/PDCCH subcarrier spacing	Config 1		kHz	30 kHz					
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			dB	0	0	0	0	0	0
N_{oc} Note2	Config 1	NR_TDD_FR1_I		Not applicable Note 5		-94		TBD	
N_{oc} Note2	Config 1	NR_TDD_FR1_I	dBm/SCS	Not applicable Note 5		-91		TBD	
$\hat{E}_s/I_{ot}$ Note6			dB	2.46	-5.97	2.46	-5.97	TBD	TBD
$\hat{E}_s/N_{oc}$ Note6			dB	6	1	6	1	TBD	TBD
SS-RSRP Note3,6	Config 1	NR_TDD_FR1_I	dBm/SCS	Not applicable Note 5	Not applicable Note 5	-85	-90	TBD	TBD
Io Note3	Config 1	NR_TDD_FR1_I	dBm/38.16MHz	Not applicable Note 5-		-51.99		TBD	
Propagation condition			-	AWGN					
Antenna configuration				1x2					

NOTE 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5:	Subtest 1 is not used when testing with 30kHz SSB SCS.
NOTE 6:	The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.11.6.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.36.1.1 and relative requirement in clause 10.1.36.1.2.

A.11.6.1.2 Intra-frequency measurement accuracy on SCC on a carrier frequency with CCA

A.11.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 10.1.36.1.1 and 10.1.36.1.2 for intra-frequency measurements under CCA.

A.11.6.1.2.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1) on the carrier frequency with CCA, and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). Supported test configurations are shown in table A.11.6.1.2.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.11.6.1.2.2-2.

Table A.11.6.1.2.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.11.6.1.2.2-2: SS-RSRP Intra frequency test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

Cell ID				489	0	489	0	489	0
SSB ARFCN				freq1		freq1		freq1	
TDD configuration	Config 1			TDDConf.1.1 CCA					
$BW_{channel}$	Config 1		MHz	40: $N_{RB,c}$ = 106					
BWP BW	Config 1			40: $N_{RB,c}$ = 106					
DL CCA model				As specified in clause A.3.20.2.1					
UL CCA model				As specified in clause A.3.20.2.2					
P_{CCA_DL}				[TBD]					
P_{CCA_UL}				[TBD]					
Downlink initial BWP configuration				DLBWP.0.1					
Downlink dedicated BWP configuration				DLBWP.1.1					
Uplink initial BWP configuration				ULBWP.0.1					
Uplink dedicated BWP configuration				ULBWP.1.1					
TRS configuration	Config 1			TRS.1.2 TDD	NA	TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle			ms	Not Applicable					
PDSCH Reference measurement channel	Config 1			SR.1.1 CCA	-	SR.1.1 CCA	-	SR.1.1 CCA	-
RMSI CORESET Reference Channel	Config 1			CR.1.1 CCA	-	CR.1.1 CCA	-	CR.1.1 CCA	-
Control channel RMC	Config 1			CR.1.1 CCA	-	CR.1.1 CCA	-	CR.1.1 CCA	-
SSB configuration for semi-static channel access	Config 1			SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA
SSB configuration for dynamic channel access	Config 1			SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA
DBT window configuration	Config 1,2,3			DBT.1	DBT.1	DBT.1	DBT.1	DBT.1	DBT.1
Time offset with Cell 1	Config 1		µs	-	3	-	3	-	3
SMTC configuration	Config 1			SMTC.1					
OCNG Patterns				OCNG pattern 1					
PDSCH/PDCCH subcarrier spacing	Config 1		kHz	30 kHz					
EPRE ratio of PSS to SSS			dB	0	0	0	0	0	0
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2	Config 1	NR_TDD_FR1_I		Not applicable Note 5		-94		TBD	
N_{oc} Note2	Config 1	NR_TDD_FR1_I	dBm/SCS	Not applicable Note 5		-91		TBD	
$\hat{E}_s/I_{ot}$ Note6			dB	2.46	-5.97	2.46	-5.97	TBD	TBD
$\hat{E}_s/N_{oc}$ Note6			dB	6	1	6	1	TBD	TBD
SS-RSRP Note3	Config 1	NR_TDD_FR1_I	dBm/SCS	Not applicable Note 5	Not applicable Note 5	-85	-90	TBD	TBD
Io Note3	Config 1	NR_TDD_FR1_I	dBm/38.16MHz	Not applicable Note 5-		-51.99		TBD	
Propagation condition			-	AWGN					
Antenna configuration				1x2					

NOTE 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5:	Subtest 1 is not used when testing with 30kHz SSB SCS.
NOTE 6:	The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.11.6.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.36.1.1 and relative requirement in clause 10.1.36.1.2.

A.11.6.2 SS-RSRQ

A.11.6.3 SS-SINR

A.11.6.4 L1-RSRP measurement for beam reporting with CCA serving cell

A.11.6.4.1 SSB based L1-RSRP measurement

A.11.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.33.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.11.6.4.1.1-1.

Table A.11.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations in each supported band	

A.11.6.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell under CCA (Cell 1). Cell 1 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model.

Two sub-tests (Test 1 and Test 2) are provided with different N_{oc} on Cell 1. The test parameters for the Cell 1 are given in Table A.11.6.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.11.6.4.1.2-1.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.11.6.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter		Config	Unit	Test 1	Test 2
SSB GSCN		1		freq1	freq1
DL CCA model		1		As specifieed in A.3.20.2.1	As specifieed in A.3.20.2.1
UL CCA model		1		As specified in A.3.20.2.2	As specified in A.3.20.2.2
Duplex mode		1		TDD	TDD
TDD configuration		1		TDDConf.1.1 CCA	TDDConf.1.1 CCA
$BW_{channel}$		1	MHz	40: $N_{RB,c}$ = 106	40: $N_{RB,c}$ = 106
PDSCH Reference measurement channel		1		SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel		1		CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel		1		CCR.1.1 CCA	CCR.1.1 CCA
SSB configuration Semi-static channel access		1		SSB.3 CCA	SSB.3 CCA
SSB configuration for Dynamic channel access		1		SSB.4 CCA	SSB.4 CCA
OCNG Patterns		1		OP.1	OP.1
Initial BWP Configuration		1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
TRS configuration		1		TRS.1.2 TDD	TRS.1.2 TDD
Dedicated BWP configuration		1		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
DBT Window Configuration		1		DBT.1	DBT.1
reportConfigType		1		periodic	periodic
reportQuantity		1		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS		1		2	2
L1-RSRP reporting period		1		slot80	slot80
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1		1	dB	0	0
N_{oc} Note2	NR_TDD_FR1_I	1	dBm/15kHz	-94.65	[-113]
N_{oc} Note2	NR_TDD_FR1_I	1	dBm/SCS	-91.65	[-110]
$\hat{E}_s/I_{ot}$		1	dB	10	-3
SS-RSRP Note3	NR_TDD_FR1_I	1	dBm/SCS	-81.65	[-113]
Io Note3	NR_TDD_FR1_I	1	dBm/ 38.16MHz	-50.19	[-77.19]
$\hat{E}_s/N_{oc}$		1	dB	10	-3
Propagation condition		1		AWGN	AWGN
Antenna configuration		1		1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

	N_{oc} to be fulfilled.
Note 3:	RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.11.6.4.1.3 Test Requirements

In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 1 shall fulfil the requirements in clauses 10.1.33.1.

A.11.6.5 RSSI

A.11.6.5.1 Intra-frequency RSSI measurement accuracy on PCC with CCA

A.11.6.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

A.11.6.5.1.2 Test parameters

In all test cases, Cell 1 is the PCell with CCA. RSSI is measured on channel number 1. Supported test configurations are shown in table A.11.6.5.1.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.11.6.5.1.2-2 and A.11.6.5.1.2-3.

Table A.11.6.5.1.2-1: Intra frequency RSSI supported test configurations

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.6.5.1.2-2: RSSI Intra frequency test parameters

Parameter		Configurations	Unit	Test 1
				Cell 1
RF Channel Number				1
$BW_{channel}$			MHz	40
SSB configuration	Semi-static channel access Note 1, 3	1		SSB.1 CCA
	Dynamic channel access Note 2, 3	1		SSB.2 CCA
P_{CCA_DL}				TBD
P_{CCA_UL}				TBD
DL CCA model				As specifieed in A.3.20.2.1
UL CCA model				As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth
Channel access bandwidth			MHz	20
DRX Cycle configuration			ms	Not Applicable
PDSCH Reference measurement channel				SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA
OCNG Patterns				OP.1
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	-Infinity
SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)				-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-87
Propagation condition			-	AWGN
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.				

Note 2:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 3:	For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.11.6.5.1.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.11.6.5.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.11.6.5.2 Intra-frequency RSSI measurement accuracy on SCC with CCA

A.11.6.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

A.11.6.5.2.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.11.6.5.2.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.11.6.5.2.2-2 and A.11.6.5.2.2-3.

Table A.11.6.5.2.2-1: Intra frequency RSSI supported test configurations

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.6.5.2.2-2: RSSI Intra frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA	CCR.1.1 CCA
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.6.5.2.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.11.6.5.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.11.6.5.3 Inter-frequency RSSI measurement accuracy on a carrier with CCA

A.11.6.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.2.

A.11.6.5.3.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is neighbor cell operating on a carrier frequency under CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.11.6.5.3.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.11.6.5.3.2-2 and A.11.6.5.3.2-3.

Table A.11.6.5.3.2-1: Inter frequency RSSI supported test configurations

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.6.5.3.2-2: RSSI Inter frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA	CCR.1.1 CCA
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.6.5.3.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.11.6.5.3.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.2. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.11.6.6 Channel occupancy

A.11.6.6.1 Intra-frequency channel occupancy measurement accuracy on PCC with CCA

A.11.6.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

A.11.6.6.1.2 Test parameters

In all test cases, Cell 1 is the PCell with CCA. channel occupancy is measured on channel number 1. Supported test configurations are shown in table A.11.6.6.1.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.11.6.6.1.2-2 and A.11.6.6.1.2-3.

Table A.11.6.6.1.2-1: Intra frequency CO supported test configurations

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.6.6.1.2-2: CO Intra frequency test parameters

Parameter		Configurations	Unit	Test 1
				Cell 1
RF Channel Number				1
$BW_{channel}$			MHz	40
SSB configuration	Semi-static channel access Note 1, 3	1		SSB.1 CCA
	Dynamic channel access Note 2, 3	1		SSB.2 CCA
P_{CCA_DL}				TBD
P_{CCA_UL}				TBD
DL CCA model				As specifieed in A.3.20.2.1
UL CCA model				As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth
Channel access bandwidth			MHz	20
DRX Cycle configuration			ms	Not Applicable
PDSCH Reference measurement channel				SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA
OCNG Patterns				OP.1
EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	-Infinity
SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)				-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/BW	-87
Propagation condition			-	AWGN
channelOccupancyThreshold			dBm	-83
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel				

	occupancy.
Note 2:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 3:	For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.

Table A.11.6.6.1.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.11.6.6.1.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.11.6.6.2 Intra-frequency channel occupancy measurement accuracy on SCC with CCA

A.11.6.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

A.11.6.6.2.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is SCell operating on a carrier frequency under CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.11.6.6.2.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.11.6.6.2.2-2 and A.11.6.6.2.2-3.

Table A.11.6.6.2.2-1: Intra frequency CO supported test configurations

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.6.6.2.2-2: CO Intra frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA	CCR.1.1 CCA
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
channelOccupancyThreshold		dBm	-83	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.6.6.2.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.11.6.6.2.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.11.6.6.3 Inter-frequency channel occupancy measurement accuracy on a carrier with CCA

A.11.6.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.34.2.

A.11.6.6.3.2 Test parameters

In all test cases, Cell 1 which is PCell operating on a carrier frequency under CCA, and Cell 2 which is neighbor cell operating on a carrier frequency under CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.11.6.6.3.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.11.6.6.3.2-2 and A.11.6.6.3.2-3.

Table A.11.6.6.3.2-1: Inter frequency CO supported test configurations

Configuration	Description
1	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz

Table A.11.6.6.3.2-2: CO Inter frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1		SSB.1 CCA	SSB.1 CCA
	Dynamic channel access Note 2, 3	1		SSB.2 CCA	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel				SR.1.1 CCA	SR.1.1 CCA
RMSI CORESET Reference Channel				CR.1.1 CCA	CR.1.1 CCA
Dedicated CORESET Reference Channel				CCR.1.1 CCA	CCR.1.1 CCA
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity
SS-RSRP in slots not corresponding			dBm/SCS	-103.5	-103.5

to RSSI measurement time configuration (RMTC)				
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
channelOccupancyThreshold		dBm	-83	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.11.6.6.3.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.11.6.6.3.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.11.6.7 E-UTRAN RSRP

A.11.6.8 E-UTRAN RSRQ

A.11.6.9 E-UTRAN SINR

A.12 E-UTRA Standalone Tests with at Least One NR Cell under CCA

A.12.1 RRC_IDLE state mobility

A.12.1.1 Inter-RAT cell re-selection to NR on a carrier frequency with CCA

A.12.1.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1 when target cell is subject to CCA

A.12.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell subject to CCA reselection requirements specified in clause 4.2.2.5.7 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell subject to CCA as given in tables A.12.1.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.12.1.1.1.1-1: Supported test configurations

Configuration	Description of a cell without CCA	Description of a cell with CCA
1	LTE FDD	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.12.1.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell subject to CCA test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell2	The UE camps on cell 2 in the initial phase
	Neighbour cell		1, 2	Cell1	
T1 end condition	Active cell			Cell1	During T1 period the UE reselects to cell 1
	Neighbour cell			Cell2	
T3 end condition	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2 during T3
	Neighbour cell		1, 2	Cell1	
RF Channel Number			1, 2	1, 2	E-UTRAN radio channel (1) and NR radio channel (2) are used for this test
Time offset between cells			1, 2	3 μs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
DBT Window Configuration			1, 2	TBD	As specified in clause A.3.28.1.
DL CCA model			1, 2	As specified in clause A.3.20.2.1	DL CCA model
UL CCA model			1, 2	As specified in clause A.3.20.2.2	UL CCA model
DRX cycle length		s	1, 2	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		s	1, 2	TBD	T1 needs to be defined so that cell re-selection reaction time is taken into account.
T2		s	1, 2	TBD	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3		s	1, 2	TBD	T3 needs to be defined so that cell re-selection reaction time is taken into account.

Table A.12.1.1.1.1-3: Cell specific test parameters for NR cell 2 subject to CCA

Parameter	Unit	Test configuration	Cell 2		
			T1	T2	T3
TDD configuration		1, 2	TBD		
DL CCA probability P_{CCA_DL}		1, 2	TBD		
UL CCA probability P_{CCA_UL}		1, 2	TBD		
$M_{d,max}$		1, 2	16		
$M_{m,max}$		1, 2	4		
$M_{e,max}$		1, 2	8		
PDSCH Reference measurement channel		1, 2	TBD		
RMSI CORESET Reference Channel		1, 2	TBD		
RMC CORESET Reference Channel		1, 2	TBD		
OCNG Patterns		1, 2	OP.1		
SSB configuration		1, 2	TBD		
Initial DL BWP configuration		1, 2	DLBWP.0.1		
Initial UL BWP configuration		1, 2	ULBWP.0.1		
RLM-RS		1, 2	SSB		
Qrxlevmin	dBm/SCS	1, 2	-137		
Pcompensation	dB	1, 2	0		
$Qhyst_s$	dB	1, 2	0		
$Qoffset_{s,n}$	dB	1, 2	0		
Cell_selection_and_reselection_quality_measurement		1, 2	SS-RSRP		
$\hat{E}_s/I_{ot}$	dB	1, 2	-4	-infinity	12
N_{oc} Note2	dBm/SCS	1, 2	-95		
N_{oc} Note2	dBm/15 kHz	1, 2	-98		
$\hat{E}_s/N_{oc}$	dB	1, 2	-4	-infinity	12
SS-RSRP Note3	dBm/SCS	1, 2	-99	-infinity	-83
Io	dBm/38.16 MHz	1, 2	-62.50	-63.95	-51.69
Treselection	s	1, 2	0	0	0
SnonintrasearchP	dB	1, 2	50		
$Thresh_{x, highP}$	dB	1, 2	48		
$Thresh_{serving, lowP}$	dB	1, 2	44		
$Thresh_{x, lowP}$	dB	1, 2	50		
Propagation Condition		1, 2	AWGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.12.1.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit	Cell 1		
		T1	T2	T3
E-UTRA RF Channel number		1		
$BW_{channel}$	MHz	10		
OCNG Patterns defined in TS 36.133 [15] clause A.3.2		OP.2 TDD for test configuration 1, 2, 3; OP.2 FDD for test configuration 4, 5, 6		
PBCH_RA	dB	0		
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB			
PHICH_RB	dB			
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA Note 1	dB			
OCNG_RB Note 1	dB			
Qrxlevmin	dBm	-140		
N_{oc} Note 2	dBm/15 kHz	-98		
RSRP Note 3	dBm/15 KHz	-84	-84	-84
$\hat{E}_s/I_{ot}$	dB	14	14	14
$\hat{E}_s/N_{oc}$	dB	14	14	14
$Treselection_{EUTRAN}$	S	0		
SnonintrasearchP	dB	50		
$Thresh_{x, highP}$	dB	48		
$Thresh_{serving, lowP}$	dB	44		
$Thresh_{x, lowP}$	dB	50		
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				

A.12.1.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell subject to CCA is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration updateon cell 2.

The cell re-selection delay to a higher priority cell shall be less than 60 + 1.28 x (5 + M_e) + T_{SI_CCA} s. M_e is the number of DRX cycles with at least one SMTC where there are no SSBs available during the $T_{evaluate,NR\_Intra\_CCA}$. If $M_e > M_{e,max}$ the UE is required to restart the evaluation of cell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher\_priority\_search}$ + $T_{evaluate, NR\_ inter\_CCA}$ + $T_{SI\_CCA,}$ and to a lower priority cell can be expressed as: $T_{evaluate, NR}$ + $T_{SI-NR,}$

Where:

$T_{higher\_priority\_search}$ See clause 4.2.2 in TS 36.133 [15]

$T_{evaluate, NR\_ inter\_CCA}$ See Table 4.2.2.5.7-1 in clause 4.2.2.5.7

T_{SI_CCA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell.

$T_{evaluate, NR}$ See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.12.2 RRC_CONNECTED state mobility

A.12.2.1 Handover

A.12.2.1.1 E-UTRAN - NR with CCA handover

A.12.2.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements specified in clause 5.3.4A in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier with CCA. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN cell and Cell 2 is an inter-RAT NR neighbour cell with CCA.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring. A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.12.2.1.1-1. General test parameters are provided in Table A.12.2.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.12.2.1.1-3 and A.12.2.1.1-4 respectively.

Table A.12.2.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

Configuration	Description
1	LTE FDD, NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.12.2.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency with CCA is used in the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is used in the test
Initial conditions	Active cell		Cell 1	E-UTRAN cell
	Neighbouring cell		Cell 2	NR cell with CCA
Final condition	Active cell		Cell 2	
DL CCA model			As specified in clause A.3.26.2.1	
UL CCA model			As specified in clause A.3.26.2.2	
NR measurement quantity			SS-RSRP	
E-UTRAN measurement quantity			RSRP	
b2-Threshold1		dBm	-84	Absolute E-UTRAN RSRP threshold for event B2
b2-Threshold2NR		dBm	As specified in Table A.12.2.1.1-4	Absolute NR SS-RSRP threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		s	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random access procedure
Time offset between cells			3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 8.1.2.1-1 started before T2 starts [15]
T1		s	[5]	
T2		s	[≤5]	
T3		s	[1]	

Table A.12.2.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover with CCA (Cell 1)

Parameter	Unit	Configuration	Cell 1		
			T1	T2	T3
RF channel number		1, 2	2		
Duplex mode		1	FDD		
		2	TDD		
TDD special subframe configuration Note1		1, 2	6		
TDD uplink-downlink configuration Note1		1, 2	1		
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100		
PRACH Configuration Note2		1	4		
		2	53		

PDSCH parameters: DL Reference Measurement Channel[Note3]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD		
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD		
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note3]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD		
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD		
OCNG Patterns[Note3]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD		
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD		
PBCH_RA	dB	1, 2	0		
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA[Note4]					
OCNG_RB[Note4]					
N_{oc}[Note5]	dBm/15kHz	1, 2	-98		
$\hat{E}_s/N_{oc}$	dB	1, 2	7	7	7
$\hat{E}_s/I_{ot}$[Note6]	dB	1, 2	7	7	7
RSRP[Note6]	dBm/15kHz	1, 2	-91	-91	-91
SCH_RP[Note6]	dBm/15kHz	1, 2	-91	-91	-91
Io[Note6]	dBm/9MHz	1, 2	-62.43	-62.43	-62.43
Propagation Condition		1, 2	AWGN		
Antenna Configuration and Correlation Matrix[Note7]		1, 2	1x2 Low		
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23]. Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 6: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].					

Table A.12.2.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR with CCA handover (Cell 2)

Parameter		Unit	Configuration	Cell 2 T1	Cell 2 T2	Cell 2 T3
RF channel number			1, 2	1		
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 4, 6		1, 2	P_{CCA_DL}=0.9375		
	Dynamic channel access Note 5, 6		1, 2	$P_{CCA\_DL\_1}$=0.75 $P_{CCA\_DL\_2}$=0.75		
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 4, 6		1, 2	P_{CCA_UL}=0.87		
	Dynamic channel access Note 5, 6		1, 2	P_{CCA_UL}=0.75		
L_{CCA_DL}		-	1, 2	5		
W_{CCA_DL}		ms	1, 2	T304		
L_{CCA_UL}		-	1, 2	5		
W_{CCA_UL}		ms	1, 2	T304		
T304		ms	1, 2	500		
Duplex mode			1, 2	TDD		
TDD Configuration			1, 2	TDDConf.1.1 CCA		
$BW_{channel}$		MHz	1, 2	40: $N_{RB,c}$ = 106 (TDD)		
PDSCH reference measurement channel			1, 2	SR.1.1 CCA		
CORESET reference channel			1, 2	CR.1.1 CCA		
PRACH configuration			1, 2	FR1 PRACH configuration 1 under CCA		
OCNG pattern Note1			1, 2	OP.1		
BWP	Initial DL BWP		1, 2	DLBWP.0.1		
	Dedicated DL BWP			DLBWP.1.1		
	Initial UL BWP			ULBWP.0.1		
	Dedicated UL BWP			ULBWP.1.1		
SMTC configuration			1, 2	SMTC.1		
SSB configuration	Semi-static channel access Note 4, 6		1, 2	SSB.1 CCA		
	Dynamic channel access Note 5, 6		1, 2	SSB.2 CCA		
DBT window configuration				As defined in A.3.28.1		
b2-Threshold2NR		dBm	1	-105		
			2	-103		
EPRE ratio of PSS to SSS		dB	1, 2	0		
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS						
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to						

PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N_{oc} Note2	dBm/15 KHz	1, 2	-98		
N_{oc} Note2	dBm/SCS	1, 2	-95		
$\hat{E}_s/N_{oc}$	dB	1, 2	-inifinit	0	0
$\hat{E}_s/I_{ot}$ Note3	dB	1, 2	-inifinit	0	0
SS-RSRP Note3	dBm/SCS	1, 2	-inifinit	-95	-95
Io Note3	dBm/38.16 MHz	1, 2	-63.96	-60.94	-60.94
Propagation condition		1, 2	AWGN		
Antenna Configuration and Correlation Matrix		1, 2	1x2 Low		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: $\hat{E}_s/I_{ot}$, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 5: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 6: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.					

A.12.2.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than TBD ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in TS36.331.

$T_{interrupt}$ = 62 + (L_1´ + L_3) * T_{SMTC}; $T_{interrupt}$ is defined in TS36.133 clause 5.3.4A.3 where

L_1´ is the number of SMTC occasions not available at the UE during the inter-RAT detection period.

L_3 is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failure. L_3 = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57].

T_{SMTC} = 20 ms is the SMTC periodicity ms in the test.

This gives a total of 112 +(L_1´ + L_3)*20 ms.

A.12.3 Signalling characteristics

A.12.3.1 Interruptions

A.12.4 Measurement procedure

A.12.4.1 E-UTRAN–NR inter-RAT SFTD measurements

A.12.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay with NR under CCA in non-DRX

A.12.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell under CCA is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier under CCA with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 2 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.12.4.1.1.1-1 below. General test parameters and cell-specific parameters for the NR cell are provided in Tables A.12.4.1.1.1-2 and A.12.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in clause A.3.7.2.1.

Table A.12.4.1.1.1-1: Applicable test configurations for inter-RAT SFTD measurement delay test with NR under CCA

Config	Description
1	LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.12.4.1.1.1-2: General test parameters for inter-RAT SFTD measurement delay test with NR under CCA

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN carrier frequencies is used.
NR RF Channel Number		Config 1,2	1		One NR carrier frequencies is used.
Active cell		Config 1,2	Cell 1		Cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		Config 1,2	Cell 2		Cell 2 is on NR RF channel number 1.
CP length		Config 1,2	Normal		Applicable to both cells.
DRX		Config 1,2	OFF		DRX is not used
Frame time offset between serving and neighbour cells	ms	Config 1	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μs	Config 2	3		Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2	0	1	SFN of Cell 2 relative to SFN of Cell 1.
SS-RSRP reporting		Config 1,2	No		Only SFTD is reported.
T1	s	Config 1,2	[2]		T1 shall exceed $T_{measure\_SFTD\_LBT\_max}$ = 56 × SMTC

Table A.12.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test with NR under CCA

Parameter		Unit	Cell 2
NR RF Channel Number			1
Duplex mode			TDD
$BW_{channel}$		MHz	40: $N_{RB,c}$ = 106
TDD configuration			TDDConf.1.1 CCA
DL CCA model			As specified in clause A.3.20.2.1
DL CCA probability for semi-static channel access Note5,7	P_{CCA_DL}		[0.75]
DL CCA probability for dynamic channel access Note6,7	$P_{CCA\_DL\_1}$		[0.75]
	$P_{CCA\_DL\_2}$		[0.75]
OCNG Pattern defined in A.3.2.1.1 Note 1			OP.1
SMTC configuration defined in A.3.2.11.1 and A.3.2.11.2			SMTC.2
SSB configuration for semi-static channel access Note5,7			SSB.1 CCA
SSB configuration for dynamic channel access Note6,7			SSB.2 CCA
DBT window configuration			DBT.1
PDSCH/PDCCH subcarrier spacing		kHz	30
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS		dB	
EPRE ratio of PBCH to PBCH DMRS		dB	
EPRE ratio of OCNG DMRS to SSS Note 1		dB	
EPRE ratio of OCNG to OCNG DMRS Note 1		dB	
N_{oc} Note2		dBm/15 kHz	-98
N_{oc} Note2		dBm/SCS	-95
SS-RSRP Note 3, 4		dBm/SCS	-91
$\hat{E}_s/I_{ot}$		dB	4
$\hat{E}_s/N_{oc}$		dB	4
Io Note 3		dBm/38.16 MHz	-62.27
Propagation Condition			AWGN

Note 1:	OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

A.12.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at $T_{RRC\_procedure\_delay} + T_{measure\_SFTD\_LBT\_max}$ after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2 \times TTI_{DCCH}$ longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.12.4.2 E-UTRAN–NR inter-RAT measurements on NR carrier frequency under CCA

A.12.4.2.1 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.12.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21A of TS 36.133 [15] for E-UTRAN FDD-NR measurements under CCA and clause 8.1.2.4.22A of TS 36.133 [15] for E-UTRAN TDD-NR measurements under CCA.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.1.1-1, A.12.4.2.1.1-2, A.12.4.2.1.1-3 and A.12.4.2.1.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.12.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.12.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.12.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.12.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		1, 2	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2	1		One FR1 NR carrier frequency under CCA is used.
DL CCA model			As specified in clause A.3.20.2.1		
UL CCA model			As specified in clause A.3.20.2.2		
Active cell		1, 2	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2	Note 1		E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2	Note 2		SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	s	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 2	3μs		Synchronous cells.
T1	s	1, 2	5		
T2	s	1, 2	$\geq T_{identify\_irat\_cca\_without\_index}$	$\geq T_{identify\_irat\_cca\_without\_index}$	$T_{identify\_irat\_cca\_without\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133
Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.1.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.1.1-4					

Table A.12.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2

RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBDfor RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2	17	17
RSRP[Note5]	dBm/15kHz	1, 2	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2	-87	-87
Io[Note5]	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2	ETU70	
Antenna Configuration and Correlation Matrix [Note6]		1, 2	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over

	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.12.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2	2	
TDD configuration		1, 2	TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106	
P_{CCA_DL}		1, 2	[TBD]	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1	
DBT window configuration		1, 2	DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30	
b2-Threshold2NR	dBm/SCS	1, 2	-98 for SS-RSRP	
		1, 2	[69for SS-RSRQ]	
	dB	1, 2	[54 For SS-SINR]	

EPRE ratio of PSS to SSS		1, 2	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2	-98	
N_{oc} Note2	dBm/SCS	1, 2	-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-63.95	-56.16
Propagation Condition		1, 2	ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.12.4.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index. $T_{identify\_irat\_cca\_without\_index}$ is defined in defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.12.4.2.2 E-UTRA-NR inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.12.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.2.1-1, A.12.4.2.2.1-2, A.12.4.2.2.1-3 and A.12.4.2.2.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.12.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.12.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.12.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.12.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2	1				One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2	1				One FR1 NR carrier frequency under CCA is used.
Active cell		1, 2	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
DL CCA model			As specified in clause A.3.20.2.1				
UL CCA model			As specified in clause A.3.20.2.2				
Neighbour cell		1, 2	NR cell 2				NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2	Note 1				E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2	Note 2				SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2	0				
CP length		1, 2	Normal				
TimeToTrigger	s	1, 2	0				
Filter coefficient		1, 2	0				L3 filtering is not used
DRX		1, 2	DRX.9	DRX.10	DRX.9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour cells		1, 2	3μs				Synchronous cells.
T1	s	1, 2	5				
T2	s	1, 2	$\geq T_{identify\_irat\_cca\_without\_index}$				$T_{identify\_irat\_cca\_without\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133
Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.1.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.1.1-4							

Table A.12.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25	

			10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBD for RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2	17	17
RSRP[Note5]	dBm/15kHz	1, 2	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2	-87	-87
Io[Note5]	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2	ETU70	
Antenna Configuration and Correlation Matrix [Note6]		1, 2	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.12.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2	1	
TDD configuration		1, 2	TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106	
P_{CCA_DL}			[TBD]	
CCA model		1, 2	TBD	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1	
DBT window configuration		1, 2	DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30	
b2-Threshold2NR	dBm/SCS	1, 2	-98 for SS-RSRP	
		1, 2	[TBD for SS-RSRQ]	
	dB	1, 2	[TBD For SS-SINR]	
EPRE ratio of PSS to SSS		1, 2	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2	-98	
N_{oc} Note2	dBm/SCS	1, 2	-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-63.95	-56.16
Propagation Condition		1, 2	ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.12.4.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_without\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.12.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.12.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.3.1-1, A.12.4.2.3.1-2, A.12.4.2.3.1-3 and A.12.4.2.3.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.12.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.12.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The UE is tested when MeasTriggerQuantity is configured as RSRP, RSRQ and SINR for each test. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.12.4.2.3.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.12.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
E-UTRA RF Channel Number		1, 2	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2	1		One FR1 NR carrier frequency under CCA is used.
DL CCA model			As specified in clause A.3.20.2.1		
UL CCA model			As specified in clause A.3.20.2.2		
Active cell		1, 2	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2	Note 1		E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2	Note 2		SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	s	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 2	3μs		Synchronous cells.
T1	s	1, 2	5		
T2	s	1, 2	$\geq T_{identify\_irat\_cca\_with\_index}$	$\geq T_{identify\_irat\_cca\_with\_index}$	$T_{identify\_irat\_cca\_with\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133
Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.3.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.3.1-4					

Table A.12.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 with SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	

Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBD for RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2	17	17
RSRP[Note5]	dBm/15kHz	1, 2	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2	-87	-87
Io[Note5]	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2	ETU70	
Antenna Configuration and Correlation Matrix [Note6]		1, 2	1x2 Low	
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively. Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				

Note 5:	$\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.12.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2	1	
TDD configuration		1, 2	TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106	
P_{CCA_DL}			[TBD]	
CCA model		1, 2	TBD	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	SMTC.1	
DBT window configuration		1, 2	DBT.1	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30	
b2-Threshold2NR	dBm/SCS	1, 2	-98 for SS-RSRP	
		1, 2	[TBD for SS-RSRQ]	
	dB	1, 2	[TBD For SS-SINR]	

EPRE ratio of PSS to SSS		1, 2	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2	-98	
N_{oc} Note2	dBm/SCS	1, 2	-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-63.95	-56.16
Propagation Condition		1, 2	ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.12.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.12.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.12.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1 on a carrier frequency with CCA. The test parameters are given in Tables A.12.4.2.4.1-1, A.12.4.2.4.1-2, A.12.4.2.4.1-3 and A.12.4.2.4.1-4. Cell transmits SSBs in DBT windows according to DL CCA model.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.12.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.12.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.12.4.2.4.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR1

Configuration	Description
1	LTE FDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
2	LTE TDD; NR with CCA: SCS 30 kHz, BW 40 MHz, TDD
NOTE: The UE is only required to pass in one of the supported test configurations in FR1	

Table A.12.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test	
E-UTRA RF Channel Number		1, 2	1				One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2	1				One FR1 NR carrier frequency under CCA is used.
DL CCA model			As specified in clause A.3.20.2.1				
UL CCA model			As specified in clause A.3.20.2.2				
Active cell		1, 2	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2	NR cell 2				NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2	Note 1				E-UTRA RSRP/RSRQ/SINR threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2	Note 2				SS-RSRP/ SS-RSRQ/ SS-SINR threshold measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2	0				
CP length		1, 2	Normal				
TimeToTrigger	s	1, 2	0				
Filter coefficient		1, 2	0				L3 filtering is not used
DRX		1, 2	DRX.9	DRX.10	DRX.9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour cells		1, 2	3μs				Synchronous cells.
T1	s	1, 2	5				
T2	s	1, 2	$\geq T_{identify\_irat\_cca\_with\_index}$				$T_{identify\_irat\_cca\_with\_index}$ is defined in clause 8.1.2.4.21A.1 and 8.1.2.4.22A.1 in TS 36.133
Note 1: The value of b2-Threshold1 is defined in Table A.12.4.2.4.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.12.4.2.4.1-4							

Table A.12.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 with SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2	1	
Duplex mode		1	FDD	
		2	TDD	
TDD special subframe configuration[Note1]		2	6	
TDD uplink-downlink configuration[Note1]		2	1	
$BW_{channel}$	MHz	1, 2	5 MHz: $N_{RB,c}$ = 25	

			10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100	
PDSCH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD	
		2	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		1	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD	
		2	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD	
OCNG Patterns[Note2]		1	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD	
		2	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD	
b2-Threshold1	dBm	1, 2	-77 for RSRP	
		1, 2	[TBD for RSRQ]	
	dB	1, 2	[TBD for SINR]	
PBCH_RA	dB	1, 2	0	
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA[Note3]				
OCNG_RB[Note3]				
N_{oc}[Note4]	dBm/15kHz	1, 2	-104	
$\hat{E}_s/N_{oc}$	dB	1, 2	17	17
$\hat{E}_s/I_{ot}$[Note5]	dB	1, 2	17	17
RSRP[Note5]	dBm/15kHz	1, 2	-87	-87
SCH_RP[Note5]	dBm/15kHz	1, 2	-87	-87
Io[Note5]	dBm/9MHz	1, 2	-59.13+10log ($N_{RB,c}$ /50)	-59.13+10log ($N_{RB,c}$ /50)
Propagation Condition [Note6]		1, 2	ETU70	
Antenna Configuration and Correlation Matrix [Note6]		1, 2	1x2 Low	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.12.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test configuration	Cell 2	
			T1	T2
NR RF Channel Number		1, 2	1	
TDD configuration		1, 2	TDDConf.1.1 CCA	
$BW_{channel}$	MHz	1, 2	40: $N_{RB,c}$ = 106	
P_{CCA_DL}			TBD	
CCA model		1, 2	TBD	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		1, 2	TBD	
DBT window configuration		1, 2	TBD	
SSB configuration for semi-static channel access		1, 2	SSB.1 CCA	
SSB configuration for dynamic channel access		1, 2	SSB.2 CCA	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	30	
b2-Threshold2NR	dBm/SCS	1, 2	-98 for SS-RSRP	
		1, 2	[TBD for SS-RSRQ]	
	dB	1, 2	[TBD For SS-SINR]	
EPRE ratio of PSS to SSS		1, 2	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} Note2	dBm/15kHz	1, 2	-98	
N_{oc} Note2	dBm/SCS	1, 2	-95	
SS-RSRP Note 3,5	dBm/SCS	1, 2	-Infinity	-88
$\hat{E}_s/I_{ot}$ Note 5	dB	1, 2	-Infinity	7
$\hat{E}_s/N_{oc}$ Note 5	dB	1, 2	-Infinity	7
Io Note3	dBm/38.16MHz	1, 2	-63.95	-56.16
Propagation Condition		1, 2	ETU70	
Antenna Configuration and Correlation Matrix		1, 2,	1x2 Low	

NOTE 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.

A.12.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than $T_{identify\_irat\_cca\_with\_index}$ ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.12.4.2.5 RSSI measurement reporting

A.12.4.2.5.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-RAT RSSI measurement reporting requirements in TS 36.133 [15, Section 8.1.2.4.21A.1.5].

A.12.4.2.5.2 Test parameters

In the test, the UE is configured to perform inter-RAT RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.12.4.2.5.2-1. There is one cell in the test: Cell 1 is E-UTRAN PCell on a licensed band. Prior to the start of the time duration T1, the UE is connected to Cell 1. The RSSI measurement is performed on an inter-RAT carrier frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.12.4.2.5.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.12.4.2.5.2-2: General test parameters.

Editor's note: Table TBD

A.12.4.2.6 Channel occupancy measurement reporting

A.12.4.2.6.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-RAT channel occupancy measurement reporting requirements in TS 36.133 [15, Section 8.1.2.4.21A.1.6].

A.12.4.2.6.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.12.4.2.6.2-1. There is one cell in the test: Cell 1 which is E-UTRAN PCell on a licensed band. Prior to the start of the time duration T1, the UE is connected to Cell 1. The channel occupancy measurement is performed on an inter-RAT carrier frequency under CCA. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1.

Table A.12.4.2.6.2-1: Supported test configurations.

Configuration	Description
1	LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
2	LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
NOTE: The UE is only required to pass in one of the supported test configurations above.	

Table A.12.4.2.6.2-2: General test parameters.

Editor's note: Table is TBD

A.12.5 Measurement performance

A.12.5.1 E-UTRAN–NR SFTD

A.12.5.1.1 Inter-RAT SFTD accuracy with NR target cell under CCA

A.12.5.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for inter-RAT SFTD measurements between E-UTRA PCell and NR target cell under CCA.

A.12.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.12.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR target cell under CCA. The test parameters of Cell 1 are given in clause A.12.5.1.1.2-2. The test parameters of Cell 2 are given in Table A.12.5.1.1.2-3. The SFTD between PCell and NR target cell shall be set by the test equipment to one of the time differences in Table A.12.5.1.1.2-4.

Table A.12.5.1.1.2-1: Supported test configurations for SFTD accuracy with NR target cell under CCA

Config	Description
1	LTE FDD NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	LTE TDD NR with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.12.5.1.1.2-2: Test parameters for inter-RAT SFTD accuracy with NR target cell under CCA (Cell 1)

Parameter	Unit	Test 1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration[Note1]		6
TDD uplink-downlink configuration[Note1]		1
$BW_{channel}$		5 MHz: $N_{RB,c}$ = 25 10 MHz: $N_{RB,c}$ = 50 20 MHz: $N_{RB,c}$ = 100
PDSCH parameters: DL Reference Measurement Channel[Note2]		5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD 5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel[Note2]		5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD 5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD
OCNG Patterns[Note2]		5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD 5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD
PBCH_RA	dB	0
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA[Note3]	dB	
OCNG_RB[Note3]	dB	
N_{oc}[Note4]	dBm/15 kHz	-104
$\hat{E}_s/N_{oc}$	dB	-3
$\hat{E}_s/I_{ot}$	dB	-3
RSRP[Note5]	dBm/15 kHz	-107
SCH_RP[Note5]	dBm/15 kHz	-107
Io[Note5]	dBm/Ch BW	-74.45 +10log ($N_{RB,c}$ /50)
Propagation Condition		AWGN
Antenna Configuration		1x2

Note 1:	Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
Note 2:	DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
Note 3:	OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 5:	Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.12.5.1.1.2-3: Test parameters for inter-RAT SFTD accuracy with NR target cell under CCA (Cell 2)

Parameter		Unit	Test 1
Duplex mode			TDD
TDD Configuration			TDDConf.1.1 CCA
$BW_{channel}$		MHz	40: $N_{RB,c}$ = 106
DL CCA model			As specified in clause A.3.20.2.1
DL CCA probability for semi-static channel access[Note6,8]	P_{CCA}		[0.75]
DL CCA probability for dynamic channel access[Note7,8]	$P_{CCA\_DL\_1}$		[0.75]
	$P_{CCA\_DL\_2}$		[0.75]
SSB configuration for semi-static channel access[Note6,8]			SSB.1 CCA
SSB configuration for dynamic channel access[Note7,8]			SSB.2 CCA
SMTC configuration			SMTC.1
DBT window configuration			DBT.1
OCNG Patterns			OP.1
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH DMRS			
EPRE ratio of OCNG DMRS to SSS[Note 1]			
EPRE ratio of OCNG to OCNG DMRS [Note 1]			
N_{oc} [Note2]		dBm/15kHz	-104
N_{oc} [Note2]		dBm/SSB SCS	-101
$\hat{E}_s/I_{ot}$		dB	-3
$\hat{E}_s/N_{oc}$		dB	-3
SS-RSRP [Note3]		dBm/SCS	-104
Io [Note3]		dBm/38.16 MHz	-68.18
Propagation condition			AWGN
Antenna configuration			1x2

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols in slots with downlink transmission bursts.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy.

Note 8:	For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.

Table A.12.5.1.1.2-4: Timing offsets for inter-RAT SFTD accuracy test with NR target cell under CCA

Configuration	SFN offset between PCell and NR neighbor cell	Frame boundary offset between PCell and NR neighbour cell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.12.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.12.5.2 E-UTRAN–NR SS-RSRP

A.12.5.3 E-UTRAN–NR SS-RSRQ

A.12.5.4 E-UTRAN–NR SS-SINR

A.12.5.5 E-UTRAN–NR RSSI

A.12.5.6 E-UTRAN–NR channel occupancy

A.13 NR Standalone Tests with NR SCell under CCA and All Other NR Cells in FR1

A.13.1 Timing

A.13.1.1 UE transmit timing

A.13.1.2 Timing advance

A.13.2 Signalling characteristics

A.13.2.1 Interruption

A.13.2.1.1 NR interruptions during SCell operations with CCA on SCell

A.13.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify NR PCell interruptions during SCell operations on an NR SCC with CCA, This test will verify the interruption requirements for NR PCell in NR SA specified in TS 38.133 clause 8.2.2 and 8.3A. Supported test configurations are shown in table A.13.2.1.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.13.2.1.1.1-2 and A.13.2.1.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 and Cell2 are PCell and SCell. Cell 1 is on a licenced band and cell 2 is subject to CCA. The test consists of five time periods, with duration of T1, T2, T3, T4 and T5. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. Throughout the test, the PCell are continuously scheduled in DL. The power of signals on cell 1 and 2 is not modified during the test.

Prior to T1, a connection is started with cell 1 as the PCell, and measurements of cell 2 are configured with gap pattern 0, such that cell 2 is reported. This ensures that cell 2 is known at the start of time period T1 and is not itself part of the tested requirement.

The point in time at which the RRC message implying Scell addition is received at the UE antenna connector, defines the start of time period T1. Measurement gap pattern 0 shall be stopped when the Scell is configured.

The point in time at which the MAC-CE message implying Scell activation is received at the UE antenna connector, defines the start of time period T2.

The point in time at which the MAC-CE message implying Scell deactivation is received at the UE antenna connector, defines the start of time period T3.

The point in time at which deactivation delay requirement in section 8.3A are satisfied defines the start of time period T4

The point in time at which the RRC message implying Scell release is received at the UE antenna connector, defines the start of time period T5.

Table A.13.2.1.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.13.2.1.1.1-2: General test parameters for Interruptions during measurements on deactivated NR SCC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured dSCell		Cell2	SCell on NR RF channel number 2
CP length		Normal	Applicable to Cell1, Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	160	
T1	s	<10	
T2	s	<10	
T3	s	<10	
T4	s	<10	
T5	s	<10	

Table A.13.2.1.1.1-3: NR cell specific test parameters for Interruptions during measurements on deactivated NR SCC

Parameter		Unit	Cell1	Cell2
			T1 T2 T3 T4 T5	T1 T2 T3 T4 T5
TDD configuration	Config 1		---	TDDConf.1.1 CCA
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52	40: $N_{RB,c}$ = 106
	Config 3		40: $N_{RB,c}$ = 106	
DL CCA model	Config 1,2,3		---	As specified in clause A.3.20.2.1
DL CCA probability for semi-static channel access[Note6,8]	P_{CCA_DL}		---	0.9375
DL CCA probability for dynamic channel access[Note7,8]	$P_{CCA\_DL\_1}$		---	0.75
	$P_{CCA\_DL\_2}$		---	0.75
Initial BWP Configuration	Config 1,2,3		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP Configuration	Config 1,2,3		DLBWP.1.1	DLBWP.1.1
Initial UL BWP Configuration	Config 1,2,3		ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP Configuration	Config 1,2,3		ULBWP.1.1	ULBWP.1.1
PDSCH reference meassurement channel	Config 1		SR.1.1 FDD	---
	Config 2		SR.1.1 TDD	
	Config 3		SR.2.1 TDD	
RMSI CORESET Parameters	Config 1		CR.1.1 FDD	---
	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
PDCCH CORESET Parameters	Config 1		CCR.1.1 FDD	---
	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
TRS configuration	Config 1		TRS.1.1 FDD	---
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
OCNG Pattern			OP.1	OP.1
SSB configuration for semi-static channel access[Note6,8]	Config 1,2		SSB.1 FR1	SSB.1 CCA
	Config 3		SSB.2 FR1	
SSB configuration for dynamic channel access[Note7,8]	Config 1,2		SSB.1 FR1	SSB.2 CCA
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1,2,3		SMTC.1	SMTC.1
DBT window configuration	Config 1,2,3		---	DBT.1
TCI state			TCI.State.0	---
Correlation Matrix and Antenna Configuration			1x2 Low	1x2 Low
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N_{oc} [Note 2]	Config 1,2,3	dBm/15 kHz	-104	-104
N_{oc} [Note 2]	Config 1,2	dBm/SCS	-104	-101
	Config 3		-101	

SS-RSRP Note 3	Config 1,2,3	dBm/15 kHz	-87	-87
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
Propagation Condition			AWGN	AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For Cell 2 with CCA model, OCNG is transmitted only in slots with downlink transmission bursts and is not transmitted during muted slots or during DBT windows. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess. Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 8: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations.				

A.13.2.1.1.2 Test Requirements

The UE shall meet the interruption requirements for SCell addition on the victim Pcell in clause 8.2.1 during time T1

The UE shall meet the interruption requirements for SCell activation on the victim Pcell in clause 8.2.1during time T2. There shall be a single interruption with time window as specified in clause 8.3A.2

The UE shall meet the interruption requirements for SCell deactivation on the victim PCell in clause 8.2.1during time T3. There shall be a single interruption with time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for deactivated SCell measurements on the victim PCell in clause 8.2.1 during time T4. The interruptions shall be within the time window as specified in clause 8.3A.3

The UE shall meet the interruption requirements for SCell release on the victim PCell in clause 8.2.1during time T5.

The rate of correct events observed during repeated tests shall be at least 90%.

A.13.2.2 SCell activation and deactivation delay

A.13.2.2.1 SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle

A.13.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell on NR-U SCC with CCA are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 160 ms.

The supported test configurations are shown in Table A.13.2.2.1.1-1.

The test parameters are given in Table A.13.2.2.1.1-2 and cell-specific parameters in Table A.13.2.2.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell: Cell 1 (PCell) on radio channel 1 (PCC) in NR FR1, and Cell2 (SCell) on radio channel

2 (SCC) in NR with CCA. Before the test starts the UE is connected to Cell 1, but is not aware of Cell 2, as the UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. At the end of T1, the test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report a valid CSI in PCell for the activated SCell at latest in slot $m + \frac{T_{\text{HARQ}}+T_{\text{activation\_time\_withCCA}}+T_{\text{CSI\_Reporting\_withCCA}}}{\text{NR slot length}}$, as defined in clause 8.3A.2. The UE shall start reporting CSI in PCell in slot $m+ \frac{T_{\text{HARQ}}+3\text{ms}}{\text{NR slot length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption shall fall within the time window specified in clause 8.3A.2. At the end of T2 the test equipment sends a MAC message for deactivation of the SCell.

The point in time at which the MAC message is received by at the UE antenna connector, in a slot # denoted n, defines the start of time period T3. The UE shall complete the activation at latest in slot $n + \frac{T_{\text{HARQ}}+3\text{ms}}{\text{NR slot length}}$. Any PCell interruption shall fall within the time window specified in clause 8.3A.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received, while taking into account CCA failures on SCC.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.13.2.2.1.1-1: Supported test configurations for SCell Activation and Deactivation of known SCell under CCA, 160 ms SCell measurement cycle

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.13.2.2.1.1-2: General test parameters for known SCell activation with SCell under CCA, 160 ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two radio channels (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every fourth slot
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ TAE as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
T3	s	1	During this time the UE shall deactivate the SCell.
T_{HARQ}	ms	k_1×NR slot length	k_1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
$T_{CSI\_Reporting}$	ms	$10 + 5 \cdot 2^{\mu_{DL}}$	the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] μ_{DL} is the subcarrier spacing configuration for DL

Table A.13.2.2.1.1-3: Cell specific test parameters for known FR1 SCell activation case with SCell under CCA, 160 ms SCell measurement cycle

Parameter		Unit	Cell 1			Cell 2		
			T1	T2	T3	T1	T2	T3
Duplex mode	Config 1		FDD			TDD		
	Config 2,3		TDD					
TDD configuration	Config 1		---			TDDConf.1.1 CCA		
	Config 2		TDDConf.1.1					
	Config 3		TDDConf.2.1					
$BW_{channel}$	Config 1,2	MHz	10: $N_{RB,c}$ = 52			40: $N_{RB,c}$ = 106		
	Config 3		40: $N_{RB,c}$ = 106					
DL CCA model			---			As specified in clause A.3.26.2.1		
DL CCA probability for semi-static channel access[Note5,7]	P_{CCA_DL}		---			0.9357		
DL CCA probability for dynamic channel access[Note6,7]	$P_{CCA\_DL\_1}$		---			0.75		
	$P_{CCA\_DL\_2}$		---			0.75		
P_{CCA_UL}						1		
L_{CCA_DL} [Note 8]						2		
W_{CCA_DL} [Note 8]		ms				$T_{activation\_time\_withCCA}$		
Initial downlink BWP configuration			DLBWP.0.2			DLBWP.0.2		
Initial uplink BWP configuration			ULBWP.0.1			ULBWP.0.1		
Dedicated downlink BWP configuration			DLBWP.0.2			DLBWP.0.2		
Dedicated uplink BWP configuration			ULBWP.0.1			ULBWP.0.1		
TCI state			TCI.State.0			TCI.State.0		
TRS Configuration	Config 1		TRS.1.1 FDD			TRS.1.2 TDD		
	Config 2		TRS.1.1 TDD					
	Config 3		TRS.1.2 TDD					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD			SR.1.1 CCA		
	Config 2		SR.1.1 TDD					
	Config 3		SR.2.1 TDD					
Dedicated CORESET parameters	Config 1		CCR.1.1 FDD			CCR.1.3 CCA		
	Config 2		CCR.1.1 TDD					
	Config 3		CCR.2.1 TDD					
RMSI CORESET parameters	Config 1		CR.1.1 FDD			CR.1.1 CCA		
	Config 2		CR.1.1 TDD					
	Config 3		CR.2.1 TDD					
OCNG Patterns [Note1]			OP.1			OP.1		
SSB Configuration for semi-static channel access[Note5,7]	Config 1,2		SSB.1 FR1			SSB.1 CCA		
	Config 3		SSB.2 FR1					
SSB Configuration for dynamic channel access[Note6,7]	Config 1,2		SSB.1 FR1			SSB.2 CCA		
	Config 3		SSB.2 FR1					
SMTC configuration			SMTC.1			SMTC.1		
DBT window configuration			---			DBT.1		
EPRE ratio of PSS to SSS		dB	0			0		
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS[Note1]								
EPRE ratio of OCNG to OCNG DMRS[Note1]								
N_{oc} [Note2]	Config 1,2	dBm/15kHz	-104			-104		

	Config 3			
N_{oc} Note2	Config 1,2	dBm/SCS	-104	-101
	Config 3		-101	
$\hat{E}_s/I_{ot}$		dB	17	17
$\hat{E}_s/N_{oc}$		dB	17	17
SS-RSRP Note3	Config 1,2	dBm/SCS	-87	-84
	Config 3		-84	-84
Io Note3	Config 1,2		-58.96	-52.87
	Config 3		-52.87	-52.87
Propagation condition		-	AWGN	
Note 1: OCNG shall be used such that resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For Cell 2 with CCA model, OCNG is transmitted only in slots with downlink transmission bursts and is not transmitted during muted slots or during DBT windows. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. Note 5: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 6: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 7: For UE supporting both semi-static and dynamic cannel access, the UE must be tested under both dynamic and semi-static channel occupancy configurations. Note 8: As specified in clause 8.3A for $L_{1,max}$, $L_{2,1,max}$, $L_{2,2,max}$, $L_{3,1,max}$, and $L_{3,2,max}$				

A.13.2.2.1.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot $m+1+\frac{\mathrm{T_{HARQ}+3ms}}{NR\ slot\ length}$.

During T2, conditioned on that downlink CCA failures L_1 and $L_{2,2}$ experienced in the SCell fulfill $L_1 \le L_{1,max}$ and $L_{2,2} \le L_{2,2,max}$ with $L_{1,max} = 2$ and $L_{2,2,max} = 2$, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA}$ = $T_{FirstSSB}$ + L_1*T_{rs} + 5ms and $T_{CSI\_reporting\_withCCA}$ = $T_{CSI\_reporting}$ + $L_{2,2}$*T_{CSI-RS} + $T_{CSI\_ReportingDelay}$, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n+\frac{\mathrm{T_{HARQ}+3ms}}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot m +1+$\frac{T_{HARQ}}{NR\ slot\ length}$ to slot m +1+$\frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with T_X = $T_{FirstSSB}$.

During T3, interruption on PCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.13.2.2.2 SCell Activation and Deactivation of known SCell under CCA, 320 ms SCell measurement cycle

A.13.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell on NR-U SCC with CCA are within the requirements stated in clause 8.3A, when the SCell is known by the UE at the time of activation and the configured SCell measurement cycle is 320 ms.

The supported test configurations are same as in Table A.13.2.2.1.1-1 above.

The test parameters are same as in Table A.13.2.2.1.1-2 above, except for parameters listed below in Table A.13.2.2.2.1-1. The cell-specific parameters are same as in Table A.13.2.2.1.1-3 above.

The test execution is the same as described in clause A.13.2.2.1 above, except that downlink CCA failures $L_{2,1}$ and $L_{2,2}$ with limits $L_{2,1} \leq L_{2,1,max}$ and $L_{2,2} \leq L_{2,2,max}$ replace L_1 as described in clause 8.3A.2 for activation of known SCell with a measurement cycle larger than 160 ms.

Table A.13.2.2.2.1-1: General test parameters for known SCell activation with SCell under CCA, 320 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.13.2.2.2.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot $m+1+\frac{T_{HARQ}+3ms}{NR\ slot\ length}$.

During T2, conditioned on that downlink CCA failures $L_{2,1}$ and $L_{2,2}$ experienced in the SCell fulfill $L_{2,1} \leq L_{2,1,max}$ and $L_{2,2} \leq L_{2,2,max}$ with $L_{2,1,max} = 2$ and $L_{2,2,max} = 2$, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA} = T_{FirstSSB\_MAX} + L_{2,1}*T_{SMTC\_MAX} + (1 + L_{2,2})*T_{rs}$ + 5ms and $T_{CSI\_reporting\_withCCA} = T_{CSI\_reporting} + T_{CSI\_ReportingDelay}$, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n+\frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot $m+1+\frac{T_{HARQ}}{NR\ slot\ length}$ to slot $m+1+\frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with $T_X = T_{FirstSSB}$.

During T3, interruption on PCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.13.2.2.3 SCell Activation and Deactivation of unknown SCell under CCA

A.13.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation delays for SCell on NR-U SCC with CCA are within the requirements stated in clause 8.3A, when the SCell is unknown to the UE at the time of activation.

The supported test configurations are same as in Table A.13.2.2.1.1-1 above.

The test parameters are same as in Table A.13.2.2.1.1-2 above, except for parameters listed below in Table A.13.2.2.3.1-1. The cell-specific parameters are same as in Table A.13.2.2.1.1-3 above.

The test execution is the same as described in clause A.13.2.2.1 above, except that downlink CCA failures $L_{3,1}$ and $L_{3,2}$ with limits $L_{3,1} \leq L_{3,1,max}$ and $L_{3,2} \leq L_{3,2,max}$ replace L_1 as described in clause 8.3A.2 for activation of unknown SCell.

Table A.13.2.2.3.1-1: General test parameters for unknown SCell activation with SCell under CCA

Parameter	Unit	Value	Comment
T1	s	0.1	During this time period the PCell shall be known and the SCell configured, but not detected.

A.13.2.2.3.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in slot $m+1+\frac{T_{HARQ}+3ms}{NR\ slot\ length}$.

During T2, conditioned on that downlink CCA failures $L_{3,1}$ and $L_{3,2}$ experienced in the SCell fulfill $L_{3,1} \leq L_{3,1,max}$ and $L_{3,2} \leq L_{3,2,max}$ with $L_{3,1,max} = 2$ and $L_{3,2,max} = 2$, respectively, the UE shall send the first valid CSI report (non-zero CQI) for the SCell in slot m + (T_{HARQ}+$T_{activation\_time\_withCCA}$ + $T_{CSI\_Reporting\_withCCA}$)/NR_slot_length, where $T_{activation\_time\_withCCA} = T_{FirstSSB\_MAX} + (1 + L_{3,1})*T_{SMTC\_MAX} + (2 + L_{3,2})*T_{rs}$ + 5ms and $T_{CSI\_reporting\_withCCA} = T_{CSI\_reporting} + T_{CSI\_ReportingDelay}$, as specified in clause 8.3A.2.

During T3, the UE shall stop sending CSI reports for SCell at latest in slot $n+\frac{T_{HARQ}+3ms}{NR\ slot\ length}$, as defined in clause 8.3A.3.

During T2, interruption on PCell shall not occur outside slot $m+1+\frac{T_{HARQ}}{NR\ slot\ length}$ to slot $m+1+\frac{T_{HARQ}+3+T_X}{NR\ slot\ length}$ with $T_X = T_{FirstSSB}$.

During T3, interruption on PCell shall not occur outside slot n +1+T_{HARQ}/NR_slot_length to slot n+1+(T_{HARQ} +3ms)/NR_slot_length.

The interruption on PCell shall not be more than specified for SA in clause 8.2.2.2.2.

The rate of correctly observed SCell activation delays and SCell deactivation delays shall for repeated tests be at least 90%.

A.13.2.3 Active TCI state switching delay

A.13.3 Measurement procedure

A.13.3.1 Intra-frequency measurements

A.13.3.1.1 Event-triggered reporting tests on SCC without gaps under non-DRX

A.13.3.1.1.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.13.3.1.1.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.13.3.1.1.2-1 and A.13.3.1.1.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information of Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
- In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
- In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.13.3.1.1.2-1: Supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.1.1.2-2: General test parameters for intra-frequency event triggered reporting without gaps

Parameter	Unit	Test configuration	Value			Comment
			Test 1	Test 2	Test 3	
Active PCell		1, 2, 3	Cell 1			
Active SCell		1, 2, 3	Cell 2			
Neighbour cell		1, 2, 3	Cell 3			Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3			
DL CCA model			As specified in clause A.3.20.2.1			
UL CCA model			As specified in clause A.3.20.2.2			
SSB configuration		1	Cell 1: SSB.1 FR1 Cell 2,3: TBD			
		2	Cell 1: SSB.1 FR1 Cell 2,3: TBD			
		3	Cell 1: SSB.2 FR1 Cell 2,3: TBD			
SMTC configuration		1	Cell 1: SMTC.2 Cell 2,3: N/A			
		2	Cell 1: SMTC.1 Cell 2,3: N/A			
		3	Cell 1: SMTC.1 Cell 2,3: N/A			
DBT window configuration		1, 2, 3	Cell 1: N/A Cell 2,3: TBD			
A3-Offset	dB	1, 2, 3	-4.5			
Event A3 measurement quantity			SS-RSRP	SS-RSRQ	SS-SINR	
CP length		1, 2, 3	Normal			
Hysteresis	dB	1, 2, 3	0			
Time To Trigger	s	1, 2, 3	0			
Filter coefficient		1, 2, 3	0			L3 filtering is not used
DRX		1, 2, 3				OFF
Time offset between Cell 2 and Cell 3		1	3 ms			Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs			Synchronous cells
		3	3 μs			Synchronous cells
T1	s	1, 2, 3	TBD			
T2	s	1, 2, 3	TBD			

Table A.13.3.1.1.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

Parameter	Unit	Test configuration	Cell 1		Cell 2		Cell 3	
			T1	T2	T1	T2	T1	T2
DL CCA probability P_{CCA_DL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
UL CCA probability P_{CCA_UL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
TDD configuration		1	N/A		TBD		TBD	
		2	TDDConf.1.1		TBD		TBD	
		3	TDDConf.2.1		TBD		TBD	
PDSCH RMC configuration		1	SR.1.1 FDD		TBD		TBD	
		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
RMSI CORESET RMC configuration		1	CR.1.1 FDD		TBD		TBD	
		2	CR.1.1 TDD		TBD		TBD	
		3	CR.2.1 TDD		TBD		TBD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		TBD		TBD	
		2	CCR.1.1 TDD		TBD		TBD	
		3	CCR.2.1 TDD		TBD		TBD	
OCNG Patterns		1, 2, 3	OP.1		TBD		TBD	
TRS Configuration		1	TRS.1.1 FDD		TBD		TBD	
		2	TRS.1.1 TDD		TBD		TBD	
		3	TRS.1.2 TDD		TBD		TBD	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
N_{oc} Note 2	dBm/15 kHz	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
$\hat{E}_s/I_{ot}$ Note 5	dB	1	4	-1.46	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
$\hat{E}_s/N_{oc}$ Note 5	dB	1	4	4	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
SS-RSRP Note 3,5	dBm/SCS kHz	1	-94	-94	TBD	TBD	-Infinity	TBD
		2	-94	-94	TBD	TBD	-Infinity	TBD
		3	-91	-91	TBD	TBD	-Infinity	TBD

Io	dBm/9.36 MHz	1	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/9.36 MHz	2	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/38.16 MHz	3	-58.50	-56.16	TBD	TBD	TBD	TBD
Propagation Condition		1, 2, 3	AWGN					
NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. NOTE 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy. NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.								

A.13.3.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.1.2 Event-triggered reporting tests on SCC without gaps under DRX

A.13.3.1.2.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.5.1 and 9.2A.5.2.

A.13.3.1.2.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.13.3.1.2.2-1 and A.13.3.1.2.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information of Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In Test 1 and Test 2, the UE is configured with SS-RSRP as Event A3 measurement quantity.

- In Test 3 and Test 4, the UE is configured with SS-RSRQ as Event A3 measurement quantity.
- In Test 5 and Test 6, the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.13.3.1.2.2-1: Supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.1.2.2-2: General test parameters for intra-frequency event triggered reporting without gaps with DRX

Parameter	Unit	Test configuration	Value						Comment
			Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	
Active PCell		1, 2, 3	Cell 1						
Active SCell		1, 2, 3	Cell 2						
Neighbour cell		1, 2, 3	Cell 3						Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3						
DL CCA model			As specified in clause A.3.20.2.1						
UL CCA model			As specified in clause A.3.20.2.2						
SSB configuration		1	Cell 1: SSB.1 FR1 Cell 2,3: TBD						
		2	Cell 1: SSB.1 FR1 Cell 2,3: TBD						
		3	Cell 1: SSB.2 FR1 Cell 2,3: TBD						
SMTC configuration		1	Cell 1: SMTC.2 Cell 2,3: N/A						
		2	Cell 1: SMTC.1 Cell 2,3: N/A						
		3	Cell 1: SMTC.1 Cell 2,3: N/A						
DBT window configuration		1, 2, 3	Cell 1: N/A Cell 2,3: TBD						
A3-Offset	dB	1, 2, 3	-4.5						
Event A3 measurement quantity			SS-RSRP		SS-RSRQ		SS-SINR		
CP length		1, 2, 3	Normal						
Hysteresis	dB	1, 2, 3	0						
Time To Trigger	s	1, 2, 3	0						
Filter coefficient		1, 2, 3	0						L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	DRX.1	DRX.2	DRX.1	DRX.2	
Time offset between Cell 2 and Cell 3		1	3 ms						Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs						Synchronous cells
		3	3 μs						Synchronous cells
T1	s	1, 2, 3	TBD						
T2	s	1, 2, 3	TBD	TBD	TBD	TBD	TBD	TBD	

Table A.13.3.1.2.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gaps

Parameter	Unit	Test configuration	Cell 1		Cell 2		Cell 3	
			T1	T2	T1	T2	T1	T2
DL CCA probability P_{CCA_DL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
UL CCA probability P_{CCA_UL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
TDD configuration		1	N/A		TBD		TBD	
		2	TDDConf.1.1		TBD		TBD	
		3	TDDConf.2.1		TBD		TBD	
PDSCH RMC configuration		1	SR.1.1 FDD		TBD		TBD	
		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
RMSI CORESET RMC configuration		1	CR.1.1 FDD		TBD		TBD	
		2	CR.1.1 TDD		TBD		TBD	
		3	CR.2.1 TDD		TBD		TBD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		TBD		TBD	
		2	CCR.1.1 TDD		TBD		TBD	
		3	CCR.2.1 TDD		TBD		TBD	
OCNG Patterns		1, 2, 3	OP.1		TBD		TBD	
TRS Configuration		1	TRS.1.1 FDD		TBD		TBD	
		2	TRS.1.1 TDD		TBD		TBD	
		3	TRS.1.2 TDD		TBD		TBD	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
N_{oc} Note 2	dBm/15 kHz	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
$\hat{E}_s/I_{ot}$ Note 5	dB	1	4	-1.46	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
$\hat{E}_s/N_{oc}$ Note 5	dB	1	4	4	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
SS-RSRP Note 3,5	dBm/SCS kHz	1	-94	-94	TBD	TBD	-Infinity	TBD
		2	-94	-94	TBD	TBD	-Infinity	TBD
		3	-91	-91	TBD	TBD	-Infinity	TBD

Io	dBm/9.36 MHz	1	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/9.36 MHz	2	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/38.16 MHz	3	-58.50	-56.16	TBD	TBD	TBD	TBD
Propagation Condition		1, 2, 3	AWGN					
NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. NOTE 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy. NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.								

A.13.3.1.2.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.1.3 Event-triggered reporting tests on SCC with per-UE gaps under non-DRX

A.13.3.1.3.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.13.3.1.3.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.13.3.1.3.2-1 and A.13.3.1.3.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information of Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In the first test (Test 1), the UE is configured with SS-RSRP as Event A3 measurement quantity.
- In the second test (Test 2), the UE is configured with SS-RSRQ as Event A3 measurement quantity.
- In the third test (Test 3), the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.13.3.1.3.2-1: Supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.1.3.2-2: General test parameters for intra-frequency event triggered reporting with per-UE gaps

Parameter	Unit	Test configuration	Value			Comment
			Test 1	Test 2	Test 3	
Active PCell		1, 2, 3	Cell 1			
Active SCell		1, 2, 3	Cell 2			
Neighbour cell		1, 2, 3	Cell 3			Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3			
Measurement gap type		1, 2, 3	Per-UE gaps			
Measurement gap repitition periodicity	ms	1, 2, 3	40			
Measurement gap length	ms	1, 2, 3	[6]			
Measurement gap offset	ms	1, 2, 3	[39]			
DL CCA model			As specified in clause A.3.20.2.1			
UL CCA model			As specified in clause A.3.20.2.2			
SSB configuration		1	Cell 1: SSB.1 FR1 Cell 2,3: TBD			
		2	Cell 1: SSB.1 FR1 Cell 2,3: TBD			
		3	Cell 1: SSB.2 FR1 Cell 2,3: TBD			
SMTC configuration		1	Cell 1: SMTC.2 Cell 2,3: N/A			
		2	Cell 1: SMTC.1 Cell 2,3: N/A			
		3	Cell 1: SMTC.1 Cell 2,3: N/A			
DBT window configuration		1, 2, 3	Cell 1: N/A Cell 2,3: TBD			
CSI-RS parameters in Cell 1		1	CSI-RS.1.2 FDD resource #0			
		2	CSI-RS.1.2 TDD resource #0			
		3	CSI-RS.2.2 TDD resource #0			
A3-Offset	dB	1, 2, 3	-4.5			
Event A3 measurement quantity			SS-RSRP	SS-RSRQ	SS-SINR	
CP length		1, 2, 3	Normal			
Hysteresis	dB	1, 2, 3	0			
Time To Trigger	s	1, 2, 3	0			
Filter coefficient		1, 2, 3	0			L3 filtering is not used
DRX		1, 2, 3				OFF
Time offset between Cell 2 and Cell 3		1	3 ms			Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs			Synchronous cells
		3	3 μs			Synchronous cells
T1	s	1, 2, 3	TBD			
T2	s	1, 2, 3	TBD			

Table A.13.3.1.3.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gap

Parameter	Unit	Test configuration	Cell 1		Cell 2		Cell 3	
			T1	T2	T1	T2	T1	T2
DL CCA probability P_{CCA_DL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
UL CCA probability P_{CCA_UL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
TDD configuration		1	N/A		TBD		TBD	
		2	TDDConf.1.1		TBD		TBD	
		3	TDDConf.2.1		TBD		TBD	
PDSCH RMC configuration		1	SR.1.1 FDD		TBD		TBD	
		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
RMSI CORESET RMC configuration		1	CR.1.1 FDD		TBD		TBD	
		2	CR.1.1 TDD		TBD		TBD	
		3	CR.2.1 TDD		TBD		TBD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		TBD		TBD	
		2	CCR.1.1 TDD		TBD		TBD	
		3	CCR.2.1 TDD		TBD		TBD	
OCNG Patterns		1, 2, 3	OP.1		TBD		TBD	
TRS Configuration		1	TRS.1.1 FDD		TBD		TBD	
		2	TRS.1.1 TDD		TBD		TBD	
		3	TRS.1.2 TDD		TBD		TBD	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		DLBWP.1.2		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
N_{oc} Note 2	dBm/15 kHz	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
$\hat{E}_s/I_{ot}$ Note 5	dB	1	4	-1.46	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
$\hat{E}_s/N_{oc}$ Note 5	dB	1	4	4	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
SS-RSRP Note 3,5	dBm/SCS kHz	1	-94	-94	TBD	TBD	-Infinity	TBD
		2	-94	-94	TBD	TBD	-Infinity	TBD
		3	-91	-91	TBD	TBD	-Infinity	TBD

Io	dBm/9.36 MHz	1	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/9.36 MHz	2	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/38.16 MHz	3	-58.50	-56.16	TBD	TBD	TBD	TBD
Propagation Condition		1, 2, 3	AWGN					
NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. NOTE 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy. NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.								

A.13.3.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1, SS-RSRQ in Test 2, SS-SINR in Test 3), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD.

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to 2xTTI$_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.1.4 Event-triggered reporting tests on SCC with per-UE gaps under DRX

A.13.3.1.4.1 Test purpose and environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2A.6.1 and 9.2A.6.2.

A.13.3.1.4.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). The test parameters for the three cells are given in Table A.13.3.1.4.2-1 and A.13.3.1.4.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the SCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information of Cell 3.

FFS: The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The test is conducted for SS-RSRP, SS-RSRQ, and SS-SINR:

- In Test 1 and Test 2, the UE is configured with SS-RSRP as Event A3 measurement quantity.
- In Test 3 and Test 4, the UE is configured with SS-RSRQ as Event A3 measurement quantity.
- In Test 5 and Test 6, the UE is configured with SS-SINR as Event A3 measurement quantity.

Table A.13.3.1.4.2-1: Supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.1.4.2-2: General test parameters for intra-frequency event triggered reporting without gap with DRX

Parameter	Unit	Test configuration	Value						Comment
			Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	
Active PCell		1, 2, 3	Cell 1						
Active SCell		1, 2, 3	Cell 2						
Neighbour cell		1, 2, 3	Cell 3						Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3						
Measurement gap type		1, 2, 3	Per-UE gaps						
Measurement gap repitition periodicity	ms	1, 2, 3	40						
Measurement gap length	ms	1, 2, 3	[6]						
Measurement gap offset	ms	1, 2, 3	[39]						
DL CCA model			As specified in clause A.3.20.2.1						
UL CCA model			As specified in clause A.3.20.2.2						
SSB configuration		1	Cell 1: SSB.1 FR1 Cell 2,3: TBD						
		2	Cell 1: SSB.1 FR1 Cell 2,3: TBD						
		3	Cell 1: SSB.2 FR1 Cell 2,3: TBD						
SMTC configuration		1	Cell 1: SMTC.2 Cell 2,3: N/A						
		2	Cell 1: SMTC.1 Cell 2,3: N/A						
		3	Cell 1: SMTC.1 Cell 2,3: N/A						
DBT window configuration		1, 2, 3	Cell 1: N/A Cell 2,3: TBD						
CSI-RS parameters in Cell 1		1	CSI-RS.1.2 FDD resource #0						
		2	CSI-RS.1.2 TDD resource #0						
		3	CSI-RS.2.2 TDD resource #0						
A3-Offset	dB	1, 2, 3	-4.5						
Event A3 measurement quantity			SS-RSRP		SS-RSRQ		SS-SINR		
CP length		1, 2, 3	Normal						
Hysteresis	dB	1, 2, 3	0						
Time To Trigger	s	1, 2, 3	0						
Filter coefficient		1, 2, 3	0						L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	DRX.1	DRX.2	DRX.1	DRX.2	
Time offset between Cell 2 and Cell 3		1	3 ms						Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs						Synchronous cells
		3	3 μs						Synchronous cells
T1	s	1, 2, 3	TBD						
T2	s	1, 2, 3	TBD	TBD	TBD	TBD	TBD	TBD	

Table A.13.3.1.4.2-3: Cell-specific test parameters for intra-frequency event-triggered reporting without gap

Parameter	Unit	Test configuration	Cell 1		Cell 2		Cell 3	
			T1	T2	T1	T2	T1	T2
DL CCA probability P_{CCA_DL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
UL CCA probability P_{CCA_UL}		1, 2, 3	N/A		TBD	TBD	TBD	TBD
TDD configuration		1	N/A		TBD		TBD	
		2	TDDConf.1.1		TBD		TBD	
		3	TDDConf.2.1		TBD		TBD	
PDSCH RMC configuration		1	SR.1.1 FDD		TBD		TBD	
		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
RMSI CORESET RMC configuration		1	CR.1.1 FDD		TBD		TBD	
		2	CR.1.1 TDD		TBD		TBD	
		3	CR.2.1 TDD		TBD		TBD	
Dedicated CORESET RMC configuration		1	CCR.1.1 FDD		TBD		TBD	
		2	CCR.1.1 TDD		TBD		TBD	
		3	CCR.2.1 TDD		TBD		TBD	
OCNG Patterns		1, 2, 3	OP.1		TBD		TBD	
TRS Configuration		1	TRS.1.1 FDD		TBD		TBD	
		2	TRS.1.1 TDD		TBD		TBD	
		3	TRS.1.2 TDD		TBD		TBD	
IInitial BWP configuration		1, 2, 3	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2, 3	DLBWP.1.1		DLBWP.1.2		DLBWP.1.1	
Active UL BWP configuration		1, 2, 3	ULBWP.1.1		DLBWP.1.2		ULBWP.1.1	
RLM-RS		1, 2, 3	SSB		SSB		SSB	
N_{oc} Note 2	dBm/SCS	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
N_{oc} Note 2	dBm/15 kHz	1	-98		TBD		TBD	
		2	-98		TBD		TBD	
		3	-95		TBD		TBD	
$\hat{E}_s/I_{ot}$ Note 5	dB	1	4	-1.46	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
$\hat{E}_s/N_{oc}$ Note 5	dB	1	4	4	TBD	TBD	-Infinity	TBD
		2			TBD	TBD	-Infinity	TBD
		3			TBD	TBD	-Infinity	TBD
SS-RSRP Note 3,5	dBm/SCS kHz	1	-94	-94	TBD	TBD	-Infinity	TBD
		2	-94	-94	TBD	TBD	-Infinity	TBD
		3	-91	-91	TBD	TBD	-Infinity	TBD

Io	dBm/9.36 MHz	1	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/9.36 MHz	2	-64.60	-62.25	TBD	TBD	TBD	TBD
	dBm/38.16 MHz	3	-58.50	-56.16	TBD	TBD	TBD	TBD
Propagation Condition		1, 2, 3	AWGN					
NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. NOTE 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy. NOTE 5: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.								

A.13.3.1.4.3 Test Requirements

The UE shall send one Event A3 triggered measurement report (SS-RSRP in Test 1 and Test 2, SS-RSRQ in Test 3 and Test 4, SS-SINR in Test 5 and Test 6), with a measurement reporting delay less than D1 ms from the beginning of time period T2.

Editor's note: D1=TBD (D1 is different for different DRX configurations).

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

FFS: NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.1.5 RSSI measurement reporting on SCC

A.13.3.1.5.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the intra-frequency RSSI measurement reporting requirements in Section 9.2A.7.1.

A.13.3.1.5.2 Test parameters

In the test, the UE is configured to perform intra-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.13.3.1.5.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.13.3.1.5.2-1: Supported test configurations.

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.1.5.2-2: General test parameters.

Parameter	Configurations	Unit	Test 1	
			Cell 1	Cell 2
RF Channel Number			1	2
$BW_{channel}$		MHz	40	40
DL CCA model			N/A	P_{CCA_DL}=1.0
UL CCA model			N/A	P_{CCA_UL}=1.0
Measurement bandwidth		n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth		n_{PRB}	TBD	
PDSCH Reference measurement channel defined in TBD			TBD	TBD
PDCCH/PCFICH/PHICH Reference measurement channel defined in TBD			TBD	TBD
OCNG Patterns defined in TBD			TBD	TBD
Other general configuration parameters: TBD			TBD	TBD
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	TBD	TBD
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	TBD	TBD
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)		dB	TBD	TBD
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)		dB	TBD	TBD
SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	TBD	TBD
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			TBD	TBD
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	TBD	TBD
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	TBD	TBD
Propagation condition		-	AWGN	

A.13.3.1.6 Channel occupancy measurement reporting on SCC

A.13.3.1.6.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the intra-frequency channel occupancy measurement reporting requirements in Section 9.2A.7.2.

A.13.3.1.6.2 Test parameters

In the test, the UE is configured to perform intra-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.13.3.1.6.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2.

Table A.13.3.1.6.2-1: Supported test configurations.

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.1.6.2-2: General test parameters.

Editor's note: Table is TBD

A.13.3.2 Inter-frequency measurements

A.13.3.2.1 RSSI measurement reporting

A.13.3.2.1.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports RSSI measurements. This test will partly verify the inter-frequency RSSI measurement reporting requirements in Section 9.3A.8.

A.13.3.2.1.2 Test parameters

In the test, the UE is configured to perform inter-frequency RSSI measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.13.3.2.1.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The RSSI measurement is performed on an inter-frequency under CCA.

Table A.13.3.2.1.2-1: Supported test configurations.

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.2.1.2-2: General test parameters.

Editor's note: Table TBD

A.13.3.2.2 Channel occupancy measurement reporting

A.13.3.2.2.1 Test purpose and environment

The purpose of this test is to verify that the UE correctly reports channel occupancy measurements. This test will partly verify the inter-frequency channel occupancy measurement reporting requirements in Section 9.3A.13.

A.13.3.2.2.2 Test parameters

In the test, the UE is configured to perform inter-frequency channel occupancy measurements on a carrier frequency under CCA.

Supported test configurations are shown in Table A.13.3.2.2.2-1. There are two cells in the test: Cell 1 is PCell on a licensed FR1 band, and Cell 2 is SCell operating on a carrier frequency under CCA. Prior to the start of the time duration T1, the UE is connected to Cell 1 and Cell 2. The channel occupancy measurement is performed on an inter-frequency under CCA.

Table A.13.3.2.2.2-1: Supported test configurations.

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.3.2.2.2-2: General test parameters.

Editor's note: Table is TBD

A.13.3.2.3 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is not used

A.13.3.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements for NR cell with CCA in clause 9.3A.4 and 9.3A.5.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.13.3.2.3.1-1, A.13.3.2.3.1-2 and A.13.3.2.3.1-3.

In test 1, measurement gap pattern configuration # 0 as defined in Table A.13.3.2.3.1-2 is provided for UE that does not support per-FR gap. In test 2, measurement gap pattern configuration #4 as defined in Table A.13.3.2.3.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.13.3.2.3.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, NR cell without CCA: NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.13.3.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2, 3		Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA.
Active cells		Config 1,2,3	NR cell 1 (PCell), NR cell 2 with CCA (SCell)		NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA.
Neighbour cell		Config 1,2,3	NR cell 3 with CCA		NR cell 3 is on NR RF channel number 3 with CCA.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1,2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	[5]		
T2	s	Config 1,2,3	[1]	[1]	

Table A.13.3.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

<table>
<tr><th colspan="2" rowspan="2">Parameter</th><th rowspan="2">Unit</th><th rowspan="2">Test configuration</th><th colspan="2">Cell 1</th><th colspan="2">Cell 2</th><th colspan="2">Cell 3</th></tr>
<tr><th>T1</th><th>T2</th><th>T1</th><th>T2</th><th>T1</th><th>T2</th></tr>
<tr><td colspan="2">NR RF Channel Number</td><td></td><td>Config 1,2,3</td><td colspan="2">1</td><td colspan="2">2</td><td colspan="2">3</td></tr>
<tr><td colspan="2" rowspan="2">Duplex mode</td><td></td><td>Config 1</td><td colspan="2">TDD</td><td colspan="2">TDD</td><td colspan="2">FDD</td></tr>
<tr><td></td><td>Config 2,3</td><td colspan="2">TDD</td><td colspan="2">TDD</td><td colspan="2">TDD</td></tr>
<tr><td colspan="2" rowspan="3">TDD configuration</td><td></td><td>Config 1</td><td colspan="2">Not Applicable</td><td colspan="2">TDDConf.1.1 CCA</td><td colspan="2">TDDConf.1.1 CCA</td></tr>
<tr><td></td><td>Config 2</td><td colspan="2">TDDConf.1.1</td><td colspan="2">TDDConf.1.1 CCA</td><td colspan="2">TDDConf.1.1 CCA</td></tr>
<tr><td></td><td>Config 3</td><td colspan="2">TDDConf.2.1</td><td colspan="2">TDDConf.1.1 CCA</td><td colspan="2">TDDConf.1.1 CCA</td></tr>
<tr><td rowspan="2">DL CCA probability P_{CCA_DL}</td><td>Semi-static channel access Note 5,7</td><td></td><td>Config 1,2,3</td><td colspan="2">Not Applicable</td><td colspan="2">TBD</td><td colspan="2">TBD</td></tr>
<tr><td>Dynamic channel access Note 6,7</td><td></td><td>Config 1,2,3</td><td colspan="2">Not Applicable</td><td colspan="2">TBD</td><td colspan="2">TBD</td></tr>
<tr><td rowspan="2">UL CCA probability P_{CCA_UL}</td><td>Semi-static channel access Note 5,7</td><td></td><td>Config 1,2,3</td><td colspan="2">Not Applicable</td><td colspan="2">TBD</td><td colspan="2">TBD</td></tr>
<tr><td>Dynamic channel access Note 6,7</td><td></td><td>Config 1,2,3</td><td colspan="2">Not Applicable</td><td colspan="2">TBD</td><td colspan="2">TBD</td></tr>
<tr><td colspan="2" rowspan="2">$BW_{channel}$</td><td rowspan="2">MHz</td><td>Config 1,2</td><td colspan="2">10: $N_{RB,c}$ = 52</td><td colspan="2">40: $N_{RB,c}$ = 106</td><td colspan="2">40: $N_{RB,c}$ = 106</td></tr>
<tr><td>Config 3</td><td colspan="2">40: $N_{RB,c}$ = 106</td><td colspan="2">40: $N_{RB,c}$ = 106</td><td colspan="2">40: $N_{RB,c}$ = 106</td></tr>
<tr><td colspan="2" rowspan="2">BWP BW</td><td rowspan="2">MHz</td><td>Config 1,2</td><td colspan="2">10: $N_{RB,c}$ = 52</td><td colspan="2">40: $N_{RB,c}$ = 106</td><td colspan="2">40: $N_{RB,c}$ = 106</td></tr>
<tr><td>Config 3</td><td colspan="2">40: $N_{RB,c}$ = 106</td><td colspan="2">40: $N_{RB,c}$ = 106</td><td colspan="2">40: $N_{RB,c}$ = 106</td></tr>
<tr><td rowspan="4">BWP configuration</td><td>Initial DL BWP</td><td></td><td rowspan="4">Config 1,2,3</td><td colspan="2">DLBWP.0.1</td><td colspan="2">DLBWP.0.1</td><td colspan="2"></td></tr>
<tr><td>Initial UL BWP</td><td></td><td colspan="2">ULBWP.0.1</td><td colspan="2">ULBWP.0.1</td><td colspan="2"></td></tr>
<tr><td>Dedicated DL BWP</td><td></td><td colspan="2">DLBWP.1.1</td><td colspan="2">DLBWP.1.1</td><td colspan="2"></td></tr>
<tr><td>Dedicated UL BWP</td><td></td><td colspan="2">ULBWP.1.1</td><td colspan="2">ULBWP.1.1</td><td colspan="2"></td></tr>
<tr><td colspan="2" rowspan="3">TRS configuration</td><td rowspan="3"></td><td>Config 1</td><td colspan="2">TRS.1.1 FDD</td><td colspan="2">TRS.1.2 TDD</td><td colspan="2"></td></tr>
<tr><td>Config 2</td><td colspan="2">TRS.1.1 TDD</td><td colspan="2">TRS.1.2 TDD</td><td colspan="2"></td></tr>
<tr><td>Config 3</td><td colspan="2">TRS.1.2 TDD</td><td colspan="2">TRS.1.2 TDD</td><td colspan="2"></td></tr>
<tr><td colspan="2">OCNG Patterns defined in A.3.2.1.1 (OP.1)</td><td></td><td>Config 1,2,3</td><td colspan="2">OP.1</td><td colspan="2">OP.1</td><td colspan="2">OP.1</td></tr>
<tr><td colspan="2" rowspan="3">PDSCH Reference measurement channel</td><td rowspan="3"></td><td>Config 1</td><td colspan="2">SR.1.1 FDD</td><td colspan="2">SR.1.1 CCA</td><td colspan="2"></td></tr>
<tr><td>Config 2</td><td colspan="2">SR.1.1 TDD</td><td colspan="2">SR.1.1 CCA</td><td colspan="2"></td></tr>
<tr><td>Config 3</td><td colspan="2">SR2.1 TDD</td><td colspan="2">SR.1.1 CCA</td><td colspan="2"></td></tr>
<tr><td colspan="2" rowspan="3">CORESET Reference Channel</td><td rowspan="3"></td><td>Config 1</td><td colspan="2">CR.1.1 FDD</td><td colspan="2">CR.1.1 CCA</td><td colspan="2"></td></tr>
<tr><td>Config 2</td><td colspan="2">CR.1.1 TDD</td><td colspan="2">CR.1.1 CCA</td><td colspan="2"></td></tr>
<tr><td>Config 3</td><td colspan="2">CR2.1 TDD</td><td colspan="2">CR.1.1 CCA</td><td colspan="2"></td></tr>
</table>

SSB parameters	Semi-static channel Note 5,7		Config 1	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 2	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 3	SSB.2 FR1		SSB.1 CCA		SSB.1 CCA	
	Dynamic channel Access Note 6,7		Config 1	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 2	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 3	SSB.2 FR1		SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1,2,3	Not Applicable		As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1		SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	15		30		30	
			Config 2	15		30		30	
			Config 3	30		30		30	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0		0	
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2		dBm/15kHz	Config 1,2,3	-98		[-104]		[-104]	
N_{oc} Note2		dBm/SCS	Config 1,2	-98		[-101]		[-101]	
			Config 3	-95		[-101]		[-101]	
SS-RSRP Note 3		dBm/SCS	Config 1,2	-94	-94	-91	-91	-Infinity	-88
			Config 3	-91	-91	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2	4	4	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2	4	4	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	Config 1,2	-64.59	-64.59	-58.49	-58.49	-63.94	-56.15
		dBm/38.16 MHz	Config 3	-58.49	-58.49	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3	AWGN		AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

A.13.3.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.2.4 Event triggered reporting tests for FR1 with CCA without SSB time index detection when DRX is used

A.13.3.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.13.3.2.4.1-1, A.13.3.2.4.1-2 and A.13.3.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.13.3.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.13.3.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.13.3.2.4.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, NR cell without CCA: NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.13.3.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2, 3				Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA.
Active cells		Config 1,2,3	NR cell 1 (PCell), NR cell 2 with CCA (SCell)				NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA.
Neighbour cell		Config 1,2,3	NR cell 3 with CCA				NR cell 3 is on NR RF channel number 3 with CCA.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9		9		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX.2	DRX.1	DRX.2	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1,2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	[5]				
T2	s	Config 1,2,3	[1.1]	[11]	[1.1]	[11]	

Table A.13.3.2.4.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA without SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2		Cell 3	
				T1	T2	T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2		3	
Duplex mode			Config 1	TDD		TDD		FDD	
			Config 2,3	TDD		TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
			Config 2	TDDConf.1.1		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
			Config 3	TDDConf.2.1		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	Not Applicable		TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3	Not Applicable		TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	Not Applicable		TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3	Not Applicable		TBD		TBD	
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		DLBWP.0.1			
	Initial UL BWP			ULBWP.0.1		ULBWP.0.1			
	Dedicated DL BWP			DLBWP.1.1		DLBWP.1.1			
	Dedicated UL BWP			ULBWP.1.1		ULBWP.1.1			
TRS configuration			Config 1	TRS.1.1 FDD		TRS.1.2 TDD			
			Config 2	TRS.1.1 TDD		TRS.1.2 TDD			
			Config 3	TRS.1.2 TDD		TRS.1.2 TDD			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		SR.1.1 CCA			
			Config 2	SR.1.1 TDD		SR.1.1 CCA			
			Config 3	SR2.1 TDD		SR.1.1 CCA			
CORESET Reference Channel			Config 1	CR.1.1 FDD		CR.1.1 CCA			
			Config 2	CR.1.1 TDD		CR.1.1 CCA			
			Config 3	CR2.1 TDD		CR.1.1 CCA			

SSB parameters	Semi-static channel Note 5,7		Config 1	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 2	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 3	SSB.2 FR1		SSB.1 CCA		SSB.1 CCA	
	Dynamic channel Access Note 6,7		Config 1	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 2	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 3	SSB.2 FR1		SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1,2,3	Not Applicable		As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1		SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	15		30		30	
			Config 2	15		30		30	
			Config 3	30		30		30	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0		0	
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2		dBm/15kHz	Config 1,2,3	-98		[-104]		[-104]	
N_{oc} Note2		dBm/SCS	Config 1,2	-98		[-101]		[-101]	
			Config 3	-95		[-101]		[-101]	
SS-RSRP Note 3		dBm/SCS	Config 1,2	-94	-94	-91	-91	-Infinity	-88
			Config 3	-91	-91	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2	4	4	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2	4	4	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	Config 1,2	-64.59	-64.59	-58.49	-58.49	-63.94	-56.15
		dBm/38.16 MHz	Config 3	-58.49	-58.49	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3	AWGN		AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.13.3.2.4.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.13.3.2.4.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.13.3.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_without\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

$T_{identify\_inter\_cca\_without\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.2.5 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is not used

A.13.3.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.13.3.2.5.1-1, A.13.3.2.5.1-2 and A.13.3.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.13.3.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.13.3.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Table A.13.3.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, NR cell without CCA: NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.13.3.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter	Unit	Test configuration	Value		Comment
			Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2, 3		Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA.
Active cells		Config 1,2,3	NR cell 1 (PCell), NR cell 2 with CCA (SCell)		NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA.
Neighbour cell		Config 1,2,3	NR cell 3 with CCA		NR cell 3 is on NR RF channel number 3 with CCA.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1		
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2		
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1,2,3	3μs		Synchronous cells.
T1	s	Config 1,2,3	[5]		
T2	s	Config 1,2,3	[1]	[1]	

Table A.13.3.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2		Cell 3	
				T1	T2	T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2		3	
Duplex mode			Config 1	TDD		TDD		FDD	
			Config 2,3	TDD		TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
			Config 2	TDDConf.1.1		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
			Config 3	TDDConf.2.1		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	Not Applicable		TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3	Not Applicable		TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	Not Applicable		TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3	Not Applicable		TBD		TBD	
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		DLBWP.0.1			
	Initial UL BWP			ULBWP.0.1		ULBWP.0.1			
	Dedicated DL BWP			DLBWP.1.1		DLBWP.1.1			
	Dedicated UL BWP			ULBWP.1.1		ULBWP.1.1			
TRS configuration			Config 1	TRS.1.1 FDD		TRS.1.2 TDD			
			Config 2	TRS.1.1 TDD		TRS.1.2 TDD			
			Config 3	TRS.1.2 TDD		TRS.1.2 TDD			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		SR.1.1 CCA			
			Config 2	SR.1.1 TDD		SR.1.1 CCA			
			Config 3	SR2.1 TDD		SR.1.1 CCA			
CORESET Reference Channel			Config 1	CR.1.1 FDD		CR.1.1 CCA			
			Config 2	CR.1.1 TDD		CR.1.1 CCA			
			Config 3	CR2.1 TDD		CR.1.1 CCA			

SSB parameters	Semi-static channel Note 5,7		Config 1	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 2	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 3	SSB.2 FR1		SSB.1 CCA		SSB.1 CCA	
	Dynamic channel Access Note 6,7		Config 1	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 2	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 3	SSB.2 FR1		SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1,2,3	Not Applicable		As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1		SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	15		30		30	
			Config 2	15		30		30	
			Config 3	30		30		30	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0		0	
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2		dBm/15kHz	Config 1,2,3	-98		[-104]		[-104]	
N_{oc} Note2		dBm/SCS	Config 1,2	-98		[-101]		[-101]	
			Config 3	-95		[-101]		[-101]	
SS-RSRP Note 3		dBm/SCS	Config 1,2	-94	-94	-91	-91	-Infinity	-88
			Config 3	-91	-91	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2	4	4	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2	4	4	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	Config 1,2	-64.59	-64.59	-58.49	-58.49	-63.94	-56.15
		dBm/38.16 MHz	Config 3	-58.49	-58.49	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3	AWGN		AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration

A.13.3.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For test 1, MGRP = 40 ms and for test 2 MGRP = 20 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.2.6 Event triggered reporting tests for FR1 with CCA with SSB time index detection when DRX is used

A.13.3.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3A.4.

In this test, there are three cells: NR cell 1 as PCell in FR1 on NR RF channel 1, NR cell 2 as SCell in FR1 with CCA on NR RF channel 2 and NR cell 3 as neighbour cell in FR1 with CCA on NR RF channel 3. The test parameters are given in Tables A.13.3.2.6.1-1, A.13.3.2.6.1-2 and A.13.3.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.13.3.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table

A.13.3.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.13.3.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1 with CCA

Config	Description
1	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR cell without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR cell with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, NR cell without CCA: NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only required to be tested in one of the supported test configurations	

Table A.13.3.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter	Unit	Test configuration	Value				Comment
			Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2, 3				Three FR1 NR carrier frequencies are used. Channels 2 and 3 are with CCA.
Active cells		Config 1,2,3	NR cell 1 (PCell), NR cell 2 with CCA (SCell)				NR cell 1 is on NR RF channel number 1. NR cell 2 is on NR RF channel number 2 with CCA.
Neighbour cell		Config 1,2,3	NR cell 3 with CCA				NR cell 3 is on NR RF channel number 3 with CCA.
DL CCA model		Config 1,2,3	As specified in clause A.3.20.2.1				
UL CCA model		Config 1,2,3	As specified in clause A.3.20.2.2				
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9		9		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX.1	DRX.2	DRX.1	DRX.2	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1,2,3	3μs				Synchronous cells.
T1	s	Config 1,2,3	[5]				
T2	s	Config 1,2,3	[1.1]	[11]	[1.1]	[11]	

Table A.13.3.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with CCA with SSB time index detection

Parameter		Unit	Test configuration	Cell 1		Cell 2		Cell 3	
				T1	T2	T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	1		2		3	
Duplex mode			Config 1	TDD		TDD		FDD	
			Config 2,3	TDD		TDD		TDD	
TDD configuration			Config 1	Not Applicable		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
			Config 2	TDDConf.1.1		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
			Config 3	TDDConf.2.1		TDDConf.1.1 CCA		TDDConf.1.1 CCA	
DL CCA probability P_{CCA_DL}	Semi-static channel access Note 5,7		Config 1,2,3	Not Applicable		TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3	Not Applicable		TBD		TBD	
UL CCA probability P_{CCA_UL}	Semi-static channel access Note 5,7		Config 1,2,3	Not Applicable		TBD		TBD	
	Dynamic channel access Note 6,7		Config 1,2,3	Not Applicable		TBD		TBD	
$BW_{channel}$		MHz	Config 1,2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP BW		MHz	Config 1,2	10: $N_{RB,c}$ = 52		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
			Config 3	40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
BWP configuration	Initial DL BWP		Config 1,2,3	DLBWP.0.1		DLBWP.0.1			
	Initial UL BWP			ULBWP.0.1		ULBWP.0.1			
	Dedicated DL BWP			DLBWP.1.1		DLBWP.1.1			
	Dedicated UL BWP			ULBWP.1.1		ULBWP.1.1			
TRS configuration			Config 1	TRS.1.1 FDD		TRS.1.2 TDD			
			Config 2	TRS.1.1 TDD		TRS.1.2 TDD			
			Config 3	TRS.1.2 TDD		TRS.1.2 TDD			
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1		OP.1	
PDSCH Reference measurement channel			Config 1	SR.1.1 FDD		SR.1.1 CCA			
			Config 2	SR.1.1 TDD		SR.1.1 CCA			
			Config 3	SR2.1 TDD		SR.1.1 CCA			
CORESET Reference Channel			Config 1	CR.1.1 FDD		CR.1.1 CCA			
			Config 2	CR.1.1 TDD		CR.1.1 CCA			
			Config 3	CR2.1 TDD		CR.1.1 CCA			

SSB parameters	Semi-static channel Note 5,7		Config 1	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 2	SSB.1 FR1		SSB.1 CCA		SSB.1 CCA	
			Config 3	SSB.2 FR1		SSB.1 CCA		SSB.1 CCA	
	Dynamic channel Access Note 6,7		Config 1	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 2	SSB.1 FR1		SSB.2 CCA		SSB.2 CCA	
			Config 3	SSB.2 FR1		SSB.2 CCA		SSB.2 CCA	
DBT window configuration			Config 1,2,3	Not Applicable		As defined in A.3.28.1		As defined in A.3.28.1	
SMTC configuration defined in A.3.11			Config 1,2,3	SMTC.1		SMTC.1		SMTC.4	
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	15		30		30	
			Config 2	15		30		30	
			Config 3	30		30		30	
EPRE ratio of PSS to SSS			Config 1,2,3	0		0		0	
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
N_{oc} Note2		dBm/15kHz	Config 1,2,3	-98		[-104]		[-104]	
N_{oc} Note2		dBm/SCS	Config 1,2	-98		[-101]		[-101]	
			Config 3	-95		[-101]		[-101]	
SS-RSRP Note 3		dBm/SCS	Config 1,2	-94	-94	-91	-91	-Infinity	-88
			Config 3	-91	-91	-91	-91	-Infinity	-88
$\hat{E}_s/I_{ot}$		dB	Config 1,2	4	4	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1,2	4	4	4	4	-Infinity	7
Io Note3		dBm/9.36 MHz	Config 1,2	-64.59	-64.59	-58.49	-58.49	-63.94	-56.15
		dBm/38.16 MHz	Config 3	-58.49	-58.49	-58.49	-58.49	-63.94	-56.15
Propagation Condition			Config 1,2,3	AWGN		AWGN		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 6:	For UE supporting dynamic channel access and network configuring dynamic channel occupancy.
Note 7:	For UE supporting both semi-static and dynamic channel access, the UE must be tested under dynamic channel access configuration.

Table A.13.3.2.6.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS 38.331 [2]
drx-InactivityTimer	ms1	ms1	
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.13.3.2.6.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.13.3.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than $T_{identify\_inter\_cca\_with\_index}$ from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

$T_{identify\_inter\_cca\_with\_index} = (T_{PSS/SSS\_sync\_inter\_cca} + T_{SSB\_measurement\_period\_inter\_cca} + T_{SSB\_time\_index\_inter\_cca})$ ms, where

$T_{PSS/SSS\_sync\_inter\_cca}$: it is the time period used in PSS/SSS detection given in table 9.3A.4-1.

$T_{SSB\_time\_index\_inter\_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3A.4-2.

$T_{SSB\_measurement\_period\_inter\_cca}$: equal to a measurement period of SSB based measurement given in table 9.3A.5-1.

For tests 1 and 2, MGRP = 40 ms and for tests 3 and 4 MGRP = 20 ms.

For tests 1 and 3, DRX cycle = 40 ms and for tests 2 and 4 DRX cycle = 640 ms.

SMTC period = 20 ms.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.3 L1-RSRP measurements for beam reporting

A.13.3.3.1 SSB based L1-RSRP measurement when DRX is not used

A.13.3.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.13.3.3.1.1-1.

Table A.13.3.3.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.13.3.3.1.2 Test parameters

There are two cells in the tests, FR1 PCell (Cell 1) and FR1 SCell (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 and Cell 2 are given in Table A.13.3.3.1.2-1 and Table A.13.3.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.13.3.3.1.2-1: General test parameters

Parameter	Config	Unit	Value	
			Cell 1	Cell 2
Active PCell/SCell Configuration			PCell	SCell
RF Channel Number			1	2
DL CCA model	1~3		N/A	As specifieed in A.3.20.2.1
UL CCA model	1~3		N/A	As specified in A.3.20.2.2
Duplex mode	1		FDD	TDD
	2		TDD	
	3		TDD	
TDD Configuration	1		N/A	TDDConf.1.1 CCA
	2		TDDConf.1.1	
	3		TDDConf.2.1	
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	40: $N_{RB,c}$ = 106
	2		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106	
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 CCA
	2		SR.1.1 TDD	
	3		SR.2.1 TDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 CCA
	2		CR.1.1 TDD	
	3		CR.2.1 TDD	
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 CCA
	2		CCR.1.1 TDD	
	3		CCR.2.1 TDD	
SSB configuration	1		SSB.3 FR1	SSB.3 CCA for semi-static channel access
	2		SSB.3 FR1	SSB.4 CCA for dynamic channel access
	3		SSB.4 FR1	
OCNG Patterns	1~3		OP.1	OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	N/A
DBT Window Configuration	1~3		N/A	DBT.1
TRS Configuration	1		TRS.1.1 FDD	TRS.1.2 TDD
	2		TRS.1.1 TDD	
	3		TRS.1.2 TDD	
DRX configuration	1~3		Off	Off
reportConfigType	1~3		periodic	periodic
reportQuantity	1~3		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3	slot	80	80
T1	1~3	s	5	5
T2	1~3	s	1	1
EPRE ratio of PSS to SSS	1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to				

SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation condition	1~3		AWGN	AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.				

Table A.13.3.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1,2,3		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1,2,3		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1,2,3		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1,2,3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2,3	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1,2,3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2,3	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2,3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1,2,3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.13.3.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTI DCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.3.3.2 SSB based L1-RSRP measurement when DRX is used

A.13.3.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5A.4.1, with the testing configurations for NR cells in Table A.13.3.3.1.1-1.

Table A.13.3.3.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.13.3.3.2.2 Test parameters

There are two cells in the tests, FR1 Pcell (Cell 1) and FR1 Scell (Cell 2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model. The test parameters and applicability for Cell 1 and Cell 2 are given in Table A.13.3.3.2.2-1 and Table A.13.3.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The UE transmits the reporting according to UL CCA model. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.13.3.3.2.2-1: General test parameters

Parameter	Config	Unit	Value	
			Cell 1	Cell 2
Active Pcell/Scell Configuration			Pcell	Scell
RF Channel Number			1	2
DL CCA model	1~3		N/A	As specifieed in A.3.20.2.1
UL CCA model	1~3		N/A	As specified in A.3.20.2.2
Duplex mode	1		FDD	TDD
	2		TDD	
	3		TDD	
TDD Configuration	1		N/A	TDDConf.1.1 CCA
	2		TDDConf.1.1	
	3		TDDConf.2.1	
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	40: $N_{RB,c}$ = 106
	2		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106	
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 CCA
	2		SR.1.1 TDD	
	3		SR.2.1 TDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 CCA
	2		CR.1.1 TDD	
	3		CR.2.1 TDD	
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 CCA
	2		CCR.1.1 TDD	
	3		CCR.2.1 TDD	
SSB configuration	1		SSB.3 FR1	SSB.3 CCA for semi-static channel access SSB.4 CCA for dynamic channel access
	2		SSB.3 FR1	
	3		SSB.4 FR1	
OCNG Patterns	1~3		OP.1	OP.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	N/A
DBT Window Configuration	1~3		N/A	DBT.1
TRS Configuration	1		TRS.1.1 FDD	TRS.1.2 TDD
	2		TRS.1.1 TDD	
	3		TRS.1.2 TDD	
DRX configuration	1~3		DRX.3	DRX.3
reportConfigType	1~3		periodic	periodic
reportQuantity	1~3		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3	slot	80	80
T1	1~3	s	5	5
T2	1~3	s	1	1
EPRE ratio of PSS to SSS	1~3	dB	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to				

SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation condition	1~3		AWGN	AWGN
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with CCA model, OCNG is transmitted only in the slots with downlink transmission burst and is not transmitted during the muted slots or during DBT window.				

Table A.13.3.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
			T1	T2	T1	T2
DL CCA Probability P_{CCA_DL} Note 4,6	1,2,3		[0.9375]	[0.9375]	[0.9375]	[0.9375]
DL CCA Probability P_{CCA_DL} Note 4.7	1,2,3		[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]	[0.75]/[0.75]
UL CCA probability P_{CCA_UL}	1,2,3		[1.0]	[1.0]	[1.0]	[1.0]
N_{oc} Note2	1,2,3	dBm/15kHz	-94.65			
N_{oc} Note2	1,2,3	dBm/SSB SCS	-91.65			
$\hat{E}_s/I_{ot}$	1,2,3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2,3	dBm/SSB SCS	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2,3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1,2,3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: DL and UL CCA probabilities apply for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.
Note 5: The signal levels apply for SSS Res when the discovery burst is transmitted during DBT windows.
Note 6: For UE supporting semi-static channel access and network configuring semi-static channel occupancy.
Note 7: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. The first value corresponds P_{CCA_DL1} and the second value corresponds to the P_{CCA_DL2}.

A.13.3.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640 ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall send L1-RSRP report of both SSB0 and SSB1 in Cell 2.

NOTE: The actual overall delays measured in the test may be up to 2xTTI DCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.13.4 Measurement performance

A.13.4.1 SS-RSRP

A.13.4.1.1 Intra-frequency measurement accuracy on a carrier frequency with CCA

A.13.4.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy on the carrier frequency with CCA is within the specified limits. This test will verify the requirements in clauses 10.1.36.1.1 and 10.1.36.1.2 for intra-frequency measurements under CCA.

A.13.4.1.1.2 Test parameters

Three cells are deployed in the test, which are FR1 PCell (Cell 1), and two cells on the same carrier frequency with CCA and transmit SSBs in DBT windows according to DL CCA model: SCell (Cell 2) and a neighbour cell (Cell 3). Supported test configurations are shown in table A.13.4.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.13.4.1.1.2-2.

Table A.13.4.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR carrier with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR carrier without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR carrier with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR carrier without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR carrier with CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode NR carrier without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.13.4.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

Cell ID			489	0	489	0	489	0
SSB ARFCN			freq1		freq1		freq1	
DL CCA model			As specified in clause A.3.20.2.1					
UL CCA model			As specified in clause A.3.20.2.2					
P_{CCA_DL}			[TBD]					
P_{CCA_UL}			[TBD]					
TDD configuration	Config 1,2,3		TDDConf.1.1 CCA					
$BW_{channel}$	Config 1,2,3	MHz	40: $N_{RB,c}$ = 106					
BWP BW	Config 1,2,3		40: $N_{RB,c}$ = 106					
CCA model	Config 1,2,3		TBD					
Downlink initial BWP configuration			DLBWP.0.1					
Downlink dedicated BWP configuration			DLBWP.1.1					
Uplink initial BWP configuration			ULBWP.0.1					
Uplink dedicated BWP configuration			ULBWP.1.1					
TRS configuration	Config 1,2,3		TRS.1.2 TDD	NA	TRS.1.2 TDD	NA	TRS.1.2 TDD	NA
DRX Cycle		ms	Not Applicable					
PDSCH Reference measurement channel	Config 1,2,3		SR.1.1 CCA	-	SR.1.1 CCA	-	SR.1.1 CCA	-
RMSI CORESET Reference Channel	Config 1,2,3		CR.1.1 CCA	-	CR.1.1 CCA	-	CR.1.1 CCA	-
Control channel RMC	Config 1,2,3		CR.1.1 CCA	-	CR.1.1 CCA	-	CR.1.1 CCA	-
SSB configuration for semi-static channel access	Config 1,2,3		SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA	SSB.1 CCA
SSB configuration for dynamic channel access	Config 1,2,3		SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA	SSB.2 CCA
DBT window configuration	Config 1,2,3		DBT.1	DBT.1	DBT.1	DBT.1	DBT.1	DBT.1
Time offset with Cell 1	Config 1,2,3	μs	-	3	-	3	-	3
SMTC configuration	Config 1,2,3		SMTC.1					
OCNG Patterns			OCNG pattern 1					
PDSCH/PDCCH subcarrier spacing	Config 1,2,3	kHz	30 kHz					
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0	0	0	0	0	0
N_{oc} Note2	Config 1,2,3 NR_TDD_FR1_I		Not applicable Note 5		-94		TBD	
N_{oc} Note2	Config 1,2,3 NR_TDD_FR1_I	dBm/SCS	Not applicable Note 5		-91		TBD	
$\hat{E}_s/I_{ot}$ Note6		dB	2.46	-5.97	2.46	-5.97	TBD	TBD
$\hat{E}_s/N_{oc}$ Note6		dB	6	1	6	1	TBD	TBD
SS-RSRP Note3,6	Config 1,2,3 NR_TDD_FR1_I	dBm/SCS	Not applicable Note 5	Not applicable Note 5	-85	-90	TBD	TBD
Io Note3	Config 1,2,3 NR_TDD_FR1_I	dBm/38.16MHz	Not applicable Note 5-		-51.99		TBD	
Propagation condition		-	AWGN					

Antenna configuration		1x2
NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. NOTE 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. NOTE 5: Subtest 1 is not used when testing with 30kHz SSB SCS. NOTE 6: The signal levels apply for SSS REs when the discovery burst is transmitted during DBT windows.		

A.13.4.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.36.1.1 and relative requirement in clause 10.1.36.1.2.

A.13.4.2 SS-RSRQ

A.13.4.3 SS-SINR

A.13.4.4 L1-RSRP measurement for beam reporting with CCA serving cell

A.13.4.4.1 SSB based L1-RSRP measurement

A.13.4.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.33.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.13.4.4.1.1-1.

Table A.13.4.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

A.13.4.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a SCell under CCA (Cell2). Cell 2 operates on a carrier frequency with CCA and transmits SSBs in DBT window according to DL CCA model.

Two sub-tests (Test 1 and Test 2) are provided with different N_{oc} on Cell 2. The test parameters for the Cell 1 and Cell 2 are given in Table A.13.4.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.13.4.4.1.2-1.

The same test is applicable for UE supporting any one or both semi-static channel access or dynamic channel access and for network configuring any of semi-static channel occupancy or dynamic channel occupancy.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. On Cell 2, UE is configured to perform L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.13.4.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
Active PCell/SCell Configuration	1~3		PCell	SCell	PCell	SCell
SSB GSCN	1~3		freq1	freq2	freq1	freq2
DL CCA model	1~3		N/A	As specifieed in A.3.20.2.1	N/A	As specifieed in A.3.20.2.1
UL CCA model	1~3		N/A	As specified in A.3.20.2.2	N/A	As specified in A.3.20.2.2
Duplex mode	1		FDD	TDD	FDD	TDD
	2,3		TDD		TDD	
TDD configuration	1		N/A	TDDConf.1.1 CCA	N/A	TDDConf.1.1 CCA
	2		TDDConf.1.1		TDDConf.1.1	
	3		TDDConf.2.1		TDDConf.2.1	
$BW_{channel}$	1	MHz	10: $N_{RB,c}$ = 52	40: $N_{RB,c}$ = 106	10: $N_{RB,c}$ = 52	40: $N_{RB,c}$ = 106
	2		10: $N_{RB,c}$ = 52		10: $N_{RB,c}$ = 52	
	3		40: $N_{RB,c}$ = 106		40: $N_{RB,c}$ = 106	
PDSCH Reference measurement channel	1		SR.1.1 FDD	SR.1.1 CCA	SR.1.1 FDD	SR.1.1 CCA
	2		SR.1.1 TDD		SR.1.1 TDD	
	3		SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET Reference Channel	1		CR.1.1 FDD	CR.1.1 CCA	CR.1.1 FDD	CR.1.1 CCA
	2		CR.1.1 TDD		CR.1.1 TDD	
	3		CR.2.1 TDD		CR.2.1 TDD	
Dedicated CORESET Reference Channel	1		CCR.1.1 FDD	CCR.1.1 CCA	CCR.1.1 FDD	CCR.1.1 CCA
	2		CCR.1.1 TDD		CCR.1.1 TDD	
	3		CCR.2.1 TDD		CCR.2.1 TDD	
SSB configuration for Semi-static channel access	1		SSB.3 FR1	SSB.3 CCA	SSB.3 FR1	SSB.3 CCA
	2		SSB.3 FR1		SSB.3 FR1	
	3		SSB.4 FR1		SSB.4 FR1	
SSB configuration for Dynamic channel access	1		SSB.3 FR1	SSB.4 CCA	SSB.3 FR1	SSB.4 CCA
	2		SSB.3 FR1		SSB.3 FR1	
	3		SSB.4 FR1		SSB.4 FR1	
TRS configuration	1		TRS.1.1 FDD	TRS.1.2 TDD	TRS.1.1 FDD	TRS.1.2 TDD
	2		TRS.1.1 TDD		TRS.1.1 TDD	
	3		TRS.1.2 TDD		TRS.1.2 TDD	
OCNG Patterns	1~3		OP.1		OP.1	
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	

SMTC configuration		1~3		SMTC.1	N/A	SMTC.1	N/A
DBT Window Configuration		1~3		N/A	DBT.1	N/A	DBT.1
reportConfigType		1~3		periodic		periodic	
reportQuantity		1~3		ssb-Index-RSRP		ssb-Index-RSRP	
Number of reported RS		1~3		2		2	
L1-RSRP reporting period		1~3		slot80		slot80	
EPRE ratio of PSS to SSS		1~3	dB	0		0	
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG DMRS to SSS Note 1							
EPRE ratio of OCNG to OCNG DMRS Note 1							
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/15 kHz	-94.65		-94.65	-
	NR_FDD_FR1_B						-
	NR_TDD_FR1_C						-
	NR_FDD_FR1_D, NR_TDD_FR1_D						-
	NR_FDD_FR1_E, NR_TDD_FR1_E						-
	NR_FDD_FR1_F						-
	NR_FDD_FR1_G						-
	NR_FDD_FR1_H						-
	NR_TDD_FR1_I					-	-113
N_{oc} Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/SSB SCS	-91.65		-91.65	-
	NR_FDD_FR1_B						-
	NR_TDD_FR1_C						-
	NR_FDD_FR1_D, NR_TDD_FR1_D						-
	NR_FDD_FR1_E, NR_TDD_FR1_E						-
	NR_FDD_FR1_F						-
	NR_FDD_FR1_G						-
	NR_FDD_FR1_H						-
	NR_TDD_FR1_I					-	-110
$\hat{E}_s/I_{ot}$		1~3	dB	10		10	-3
SS-RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1~3	dBm/SCS	-81.65		-81.65	-
	NR_FDD_FR1_B						-
	NR_TDD_FR1_C						-
	NR_FDD_FR1_D, NR_TDD_FR1_D						-
	NR_FDD_FR1_E, NR_TDD_FR1_E						-
	NR_FDD_FR1_F						-
	NR_FDD_FR1_G						-
	NR_FDD_FR1_H						-
	NR_TDD_FR1_I					-	-113
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A	1~3	dBm/38.16M	-50.19		-50.19	-

	NOTE 5		Hz			
	NR_FDD_FR1_B					-
	NR_TDD_FR1_C					-
	NR_FDD_FR1_D, NR_TDD_FR1_D					-
	NR_FDD_FR1_E, NR_TDD_FR1_E					-
	NR_FDD_FR1_F					-
	NR_FDD_FR1_G					-
	NR_FDD_FR1_H					-
	NR_TDD_FR1_I				-	-77.19
$\hat{E}_s/N_{oc}$		1~3	dB	10	10	-3
Propagation condition		1~3		AWGN	AWGN	
Antenna configuration		1~3		1x2	1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.13.4.4.1.3 Test Requirements

In both Test 1 and Test 2, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.33.1.

A.13.4.5 RSSI

A.13.4.5.1 Intra-frequency RSSI measurement accuracy on a carrier with CCA

A.13.4.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.1.

A.13.4.5.1.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the SCell with CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.13.4.5.1.2-1. The accuracy of RSSI intra-frequency measurements is tested by using the parameters in A.13.4.5.1.2-2 and A.13.4.5.1.2-3.

Table A.13.4.5.1.2-1: Intra frequency RSSI supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.4.5.1.2-2: RSSI Intra frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel		1		SR.1.1 FDD	SR.1.1 CCA
		2,3		SR.1.1 TDD	
RMSI CORESET Reference Channel		1		CR.1.1 FDD	CR.1.1 CCA
		2,3		CR.1.1 TDD	
Dedicated CORESET Reference Channel		1		CCR.1.1 FDD	CCR.1.1 CCA
		2,3		CCR.1.1 TDD	
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity

SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-103.5	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-101.6	-87
Propagation condition		-	AWGN	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.13.4.5.1.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.13.4.5.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.1. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.13.4.5.2 Inter-frequency RSSI measurement accuracy on a carrier with CCA

A.13.4.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSSI measurement accuracy is within the specified limits. This test will partially verify the RSSI measurement accuracy requirements in Section 10.1.34.2.

A.13.4.5.2.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the neighbour with CCA. RSSI is measured on channel number 2. Supported test configurations are shown in table A.13.4.5.2.2-1. The accuracy of RSSI inter-frequency measurements is tested by using the parameters in A.13.4.5.2.2-2 and A.13.4.5.2.3.

Table A.13.4.5.2.2-1: Inter frequency RSSI supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.4.5.2.2-2: RSSI Inter frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel		1		SR.1.1 FDD	NA
		2,3		SR.1.1 TDD	
RMSI CORESET Reference Channel		1		CR.1.1 FDD	NA
		2,3		CR.1.1 TDD	
Dedicated CORESET Reference Channel		1		CCR.1.1 FDD	NA
		2,3		CCR.1.1 TDD	
OCNG Patterns				OP.1	NA
EPRE ratio of PSS to SSS			dB	0	NA
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity

SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-103.5	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-101.6	-87
Propagation condition		-	AWGN	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.13.4.5.2.2-3: RSSI RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.13.4.5.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 10.1.34.2. The nominal RSSI used to evaluate the requirement shall be based on Io in slots corresponding to RSSI measurement time configuration (RMTC).

A.13.4.6 Channel occupancy

A.13.4.6.1 Intra-frequency channel occupancy measurement accuracy on SCC with CCA

A.13.4.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.1.

A.13.4.6.1.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the SCell with CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.13.4.6.1.2-1. The accuracy of channel occupancy intra-frequency measurements is tested by using the parameters in A.13.4.6.1.2-2 and A.13.4.6.1.2-3.

Table A.13.4.6.1.2-1: Intra frequency CO supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.4.6.1.2-2: CO Intra frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel		1		SR.1.1 FDD	SR.1.1 CCA
		2,3		SR.1.1 TDD	
RMSI CORESET Reference Channel		1		CR.1.1 FDD	CR.1.1 CCA
		2,3		CR.1.1 TDD	
Dedicated CORESET Reference Channel		1		CCR.1.1 FDD	CCR.1.1 CCA
		2,3		CCR.1.1 TDD	
OCNG Patterns				OP.1	OP.1
EPRE ratio of PSS to SSS			dB	0	0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity

SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-103.5	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
channelOccupancyThreshold		dBm	-83	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.13.4.6.1.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.13.4.6.1.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

A.13.4.6.2 Inter-frequency channel occupancy measurement accuracy on a carrier with CCA

A.13.4.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy measurement accuracy is within the specified limits. This test will partially verify the channel occupancy measurement accuracy requirements in Section 10.1.35.2.

A.13.4.6.2.2 Test parameters

In all test cases, Cell 1 is the PCell on a licensed FR1 band and Cell 2 is the neighbour with CCA. Channel occupancy is measured on channel number 2. Supported test configurations are shown in table A.13.4.6.2.2-1. The accuracy of channel occupancy inter-frequency measurements is tested by using the parameters in A.13.4.6.2.2-2 and A.13.4.6.2.3.

Table A.13.4.6.2.2-1: Inter frequency CO supported test configurations

Configuration	Description
1	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
2	Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
3	Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Table A.13.4.6.2.2-2: CO Inter frequency test parameters

Parameter		Configurations	Unit	Test 1	
				Cell 1	Cell 2
RF Channel Number				1	2
$BW_{channel}$			MHz	40	40
SSB configuration	Semi-static channel access Note 1, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.1 CCA
	Dynamic channel access Note 2, 3	1,2,3		Configuration 1,2: SSB.1 FR1 Configuration 3: SSB.2 FR1	SSB.2 CCA
P_{CCA_DL}				1	TBD
P_{CCA_UL}				1	TBD
DL CCA model				N/A	As specifieed in A.3.20.2.1
UL CCA model				N/A	As specified in A.3.20.2.2
Measurement bandwidth			n_{PRB}	Same as channel access bandwidth	
Channel access bandwidth			MHz	20	
DRX Cycle configuration			ms	Not Applicable	
PDSCH Reference measurement channel		1		SR.1.1 FDD	NA
		2,3		SR.1.1 TDD	
RMSI CORESET Reference Channel		1		CR.1.1 FDD	NA
		2,3		CR.1.1 TDD	
Dedicated CORESET Reference Channel		1		CCR.1.1 FDD	NA
		2,3		CCR.1.1 TDD	
OCNG Patterns				OP.1	NA
EPRE ratio of PSS to SSS			dB	0	NA
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N_{oc} in slots not corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-106
N_{oc} in slots corresponding to RSSI measurement time configuration (RMTC)			dBm/SCS	-106	-87
$\hat{E}_s/I_{ot}$ in slots not corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	2.5
$\hat{E}_s/I_{ot}$ in slots corresponding to RSSI measurement time configuration (RMTC)			dB	2.5	-Infinity

SS-RSRP in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/SCS	-103.5	-103.5
SS-RSRP in slots corresponding to RSSI measurement time configuration (RMTC)			-103.5	-Infinity
Io within measurement bandwidth in slots not corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-101.6
Io within measurement bandwidth in slots corresponding to RSSI measurement time configuration (RMTC)		dBm/BW	-101.6	-87
Propagation condition		-	AWGN	
channelOccupancyThreshold		dBm	-83	
Note 1: For UE supporting semi-static channel access and network configuring semi-static channel occupancy. Note 2: For UE supporting dynamic channel access and network configuring dynamic channel occupancy. Note 3: For a UE supporting both semi-static and dynamic channel access, the UE can be tested under dynamic channel occupancy only.				

Table A.13.4.6.2.2-3: CO RMTC parameters

measDurationSymbols-r16	sym14or12
rmtc-Periodicity-r16	ms40
rmtc-SubframeOffset-r16	20
ref-SCS-CP-r16	kHz15
ReportInterval	ms120

A.13.4.6.2.3 Test Requirements

The nominal reported *channelOccupancy s*hall be TBD. At least 90% of channel occupancy reports made by the UE shall indicate this value.

Annex B (normative): Conditions for RRM requirements applicability for operating bands

B.1 Conditions for NR RRC_IDLE state mobility

B.1.1 Introduction

In Annex B.1, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 4,
- UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 4.

B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This clause defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP dBm / SCS_{SSB}		SSB Ês/Iot dB
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A	-124	-121	≥ -4
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_F	-121.5	-118.5	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot
			dBm / SCS_{SSB}						dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$	$-120.4+Y_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-4
		n258	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$	$-120.6+Y_5$		
		n259			-105.5				
		n260	$-122.3+Y_1$		-106.5	$-122.8+Y_4$			
		n261	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$			
		n262	$-120.3+Y_1$	-105.6	-103.6	$-118.8+Y_4$			
	Spherical coverage Note 1	n257	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$	$-112.4+Z_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-4
		n259			-92.7				
		n258	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$	$-112.6+Z_5$		
		n260	$-114.3+Z_1$		-93.9	$-110.8+Z_4$			
		n261	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$			
		n262	$-112.1+Z_1$	-93.7	-90.5	$-106.7+Z_4$			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.1.2-2:

- The value of Y for Power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1, 4 and 5 respectively

- The value of Z for Power classes 1, 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for Power classes 1, 4 and 5 respectively

B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

This clause defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.2-1 for FR1 NR intra-frequency cell re-selection shall also apply for FR1 NR inter-frequency cells in this clause.

The conditions defined in Table B.1.2-2 for FR2 NR intra-frequency cell re-selection shall also apply for FR2 NR inter-frequency cells in this clause.

B.2 Conditions for UE measurements procedures and performance requirements in RRC_CONNECTED state

B.2.1 Introduction

B.2.1.1 General

In Annex B.2, the following conditions are specified:

- The conditions for RRC connection release with redirection to NR requirements in clause 6.2.3.2.1,

- The conditions for UE transmit timing adjustment in clause 7.1
- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 9,

  UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in clause 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in clause 10.

B.2.1.2 Derivation of Minimum SSB_RP values for FR1

[FFS]

B.2.1.3 Derivation of Minimum SSB_RP values for FR2

Editor's note:

- The Assumption for UE beams (fine or rough) in Annex A RRM test cases is defined based on power class 3, and unless otherwise stated also applies for other UE power classes

B.2.1.3.1 Minimum SSB_RP values for Rx Beam Peak angle of arrival

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on Reference sensitivity for the Operating band and for the UE power class, taking a baseline of UE Power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = Reference sensitivity $_{PC3,\ n260,\ 50MHz}$ +Y -10Log$_{10}$(PRB$_{Refsens}$ x 12) – SNR$_{Refsens}$ + SSB Ês/Iot + $\Delta MB_{P,n}$

where:

Reference sensitivity $_{PC3,\ n260,\ 50MHz}$ is the reference sensitivity value in dBm specified for power class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19];

Y is the gain difference between fine and rough beams, which is defined in Table B.2.1.3.1-1;

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

Value "Y" in dB, for each UE power class				
1	**2**	**3**	**4**	**5**
FFS	9.0	7.0	FFS	FFS

PRB$_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNR$_{Refsens}$ is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

$\Delta MB_{P,n}$ is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is (-109.5+$\Delta MB_{P,n}$) dBm/120kHz for intra-frequency measurements and (-107.5+$\Delta MB_{P,n}$) dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = -109.5 dBm/120kHz + Refsens $_{PC\_X,\ Band\_Y,\ 50MHz}$ – Refsens $_{PC3,\ n260,\ 50MHz}$ + Y $_{PC\_X}$ – Y $_{PC3}$ +$\Delta MB_{P,n}$,

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = -107.5 dBm/120kHz + Refsens $_{PC\_X,\ Band\_Y,\ 50MHz}$ – Refsens $_{PC3,\ n260,\ 50MHz}$ + Y $_{PC\_X}$ – Y $_{PC3}$ +$\Delta MB_{P,n}$.

B.2.1.3.2 Minimum SSB_RP values for angle of arrival within Spherical coverage

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS spherical coverage for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = EIS spherical coverage $_{PC3,\ n260,\ 50MHz}$ +Z -10Log$_{10}$(PRB$_{Refsens}$ x 12) – SNR$_{Refsens}$ + SSB Ês/Iot + $\Delta MB_{S,n}$

where:

EIS spherical coverage $_{PC3,\ n260,\ 50MHz}$ is the EIS spherical coverage value in dBm specified for power class 3 in Band n260 for 50MHz Channel bandwidth in TS 38.101-2 [19] Table 7.3.4.3-1;

Z is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.2-1;

Table B.2.1.3.2-1: Gain difference Z between fine and rough beams, Spherical coverage directions

Value "Z" in dB, for each UE power class				
1	2	3	4	5
FFS	9.0	7.0	FFS	FFS

PRB$_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNR$_{Refsens}$ is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

$\Delta MB_{S,n}$ is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is (-96.9+$\Delta MB_{S,n}$) dBm/120kHz for intra-frequency measurements and is (-94.9+$\Delta MB_{S,n}$) dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = -96.9 dBm/120kHz + EIS spherical coverage $_{PC\_X,\ Band\_Y,\ 50MHz}$ – EIS spherical coverage $_{PC3,\ n260,\ 50MHz}$ + Z_{PC_X} – Z_{PC3} +$\Delta MB_{S,n}$

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = -94.9 dBm/120kHz + EIS spherical coverage $_{PC\_X,\ Band\_Y,\ 50MHz}$ – EIS spherical coverage $_{PC3,\ n260,\ 50MHz}$ + Z_{PC_X} – Z_{PC3} +$\Delta MB_{S,n}$

B.2.1.4 Gain to SS-RSRP and CSI-RSRP measurement point for FR1

In FR1 conducted requirements are specified at the UE antenna connector, which is also the SS-RSRP and CSI-RSRP measurement point.

B.2.1.5 Gain to SS-RSRP and CSI-RSRP measurement point for FR2

B.2.1.5.1 Gain to SS-RSRP and CSI-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.1 of TS 38.215 [4] SS-RSRP and CSI-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain "G" relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain "G" affects absolute signal level values reported by the UE.

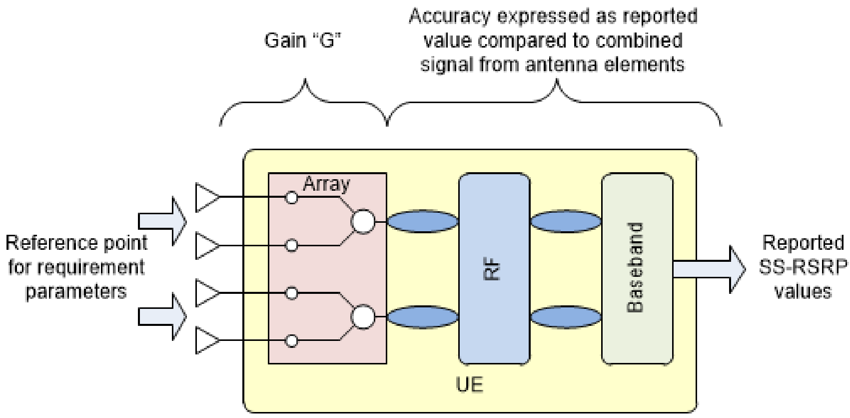

Figure B.2.1.5.1-1: Gain and Reference point for requirement parameters

The gain range for each power class is specified in Table B.2.1.5.1-1.

Table B.2.1.5.1-1: UE gain G, Rx beam peak direction

	UE Power class				
	1	2	3	4	5
Minimum, dBi	FFS	FFS	-10	FFS	FFS
Maximum, dBi	FFS	FFS	+20	FFS	FFS

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

B.2.1.6 Gain to PRS-RSRP measurement point for FR2

B.2.1.6.1 Gain to PRS-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.28 of TS 38.215 [4] PRS-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain "G" relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain "G" affects absolute signal level values reported by the UE.

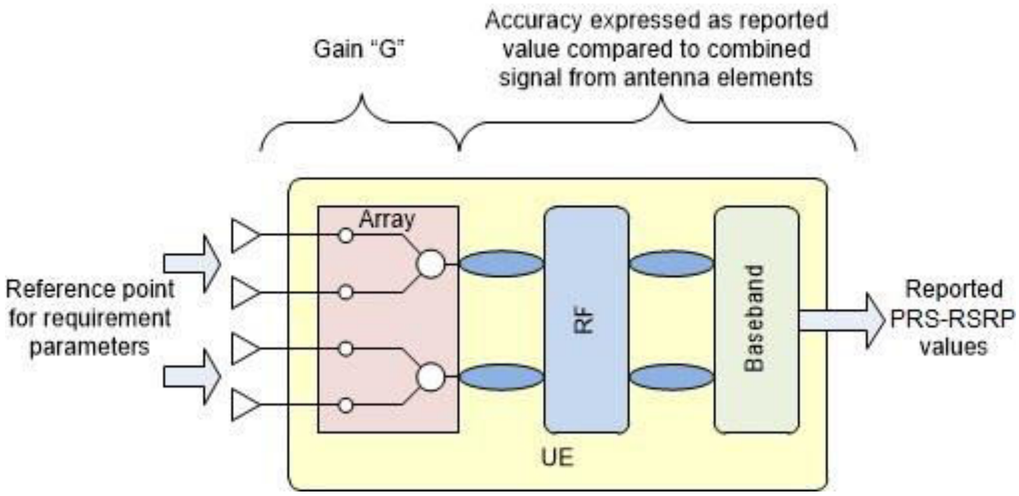

Figure B.2.1.6.1-1: Gain and Reference point for requirement parameters

The gain range for each power class is specified in Table B.2.1.61-1.

Table B.2.1.6.1-1: UE gain G, Rx beam peak direction

	UE Power class			
	1	2	3	4
Minimum, dBi	FFS	FFS	[-10]	FFS
Maximum, dBi	FFS	FFS	[+20]	FFS

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

B.2.2 Conditions for NR intra-frequency measurements

This clause defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

Table B.2.2-1: Conditions for intra-frequency measurements in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP dBm / SCS_{SSB}		SSB Ês/Iot
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	dB
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124	≥ -6
	NR_FDD_FR1_B	-126.5	-123.5	
	NR_TDD_FR1_C	-126	-123	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122	
	NR_FDD_FR1_F	-124.5	-121.5	
	NR_FDD_FR1_G	-124	-121	
	NR_FDD_FR1_H	-123.5	-120.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot
			dBm / SCS_{SSB}						dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	-128.3+Y_1	-113.8	-112.1	-127.8+Y_4	-123.4+Y_5	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-6
		n258	-128.3+Y_1	-113.8	-112.1	-127.8+Y_4	-123.6+Y_5		
		n259			-108.5				
		n260	-125.3+Y_1		-109.5	-125.8+Y_4			
		n261	-128.3+Y_1	-113.8	-112.1	-127.8+Y_4			
		n262	-123.3+Y_1	-108,6	-106.6	-121.8+Y_4			
	Spherical coverage Note 1	n257	-120.3+Z_1	-102.8	-101.2	-118.8+Z_4	-115.4+Z_5	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-6
		n258	-120.3+Z_1	-102.8	-101.2	-118.8+Z_4	-115.6+Z_5		
		n259			-95.7				
		n260	-117.3+Z_1		-96.9	-113.8+Z_4			
		n261	-120.3+Z_1	-102.8	-101.2	-118.8+Z_4			
		n262	-115.1+Z_1	-96.7	-93.5	-109.7+Z_4			
Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. Note 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise. Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].									

Editor's notes for Table B.2.2-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

The conditions are defined in Table B.2.3-2 for FR2 NR cells.

Table B.2.3-1: Conditions for inter-frequency measurements in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP		SSB Ês/Iot
		dBm / SCS_{SSB}		dB
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122	≥ -4
	NR_FDD_FR1_B	-124.5	-121.5	
	NR_TDD_FR1_C	-124	-121	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_F	-122.5	-119.5	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot
			dBm / SCS_{SSB}						dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-126.3+Y_1$	-111.8	-110.1	$-125.8+Y_4$	$-121.4+Y_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-4
		n258	$-126.3+Y_1$	-111.8	-110.1	$-125.8+Y_4$	$-121.6+Y_5$		
		n259			-106.5				
		n260	$-123.3+Y_1$		-107.5	$-123.8+Y_4$			
		n261	$-126.3+Y_1$	-111.8	-110.1	$-125.8+Y_4$			
		n262	$-121.3+Y_1$	-106.6	-104.6	$-119.8+Y_4$			
	Spherical coverage Note 1	n257	$-118.3+Z_1$	-100.8	-99.2	$-116.8+Z_4$	$-113.4+Z_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-4
		n258	$-118.3+Z_1$	-100.8	-99.2	$-116.8+Z_4$	$-113.6+Z_5$		
		n259			-93.7				
		n260	$-115.3+Z_1$		-94.9	$-111.8+Z_4$			
		n261	$-118.3+Z_1$	-100.8	-99.2	$-116.8+Z_4$			
		n262	$-113.1+Z_1$	-94.7	-91.5	$-107.7+Z_4$			
NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise. NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].									

Editor's notes for Table B.2.3-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.4 Conditions for NR L1-RSRP reporting

B.2.4.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.1-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.1-2 for FR2 NR cells.

Table B.2.4.1-1: Conditions for SSB based L1-RSRP measurements in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP		SSB Ês/Iot
		dBm / SCS_{SSB}		dB
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	≥ -3
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_F	-121.5	-118.5	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

Table B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot
			dBm / SCS_{SSB}						dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$	$-120.4+Y_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-3
		n258	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$	$-120.6+Y_5$		
		n259			-105.5				
		n260	$-122.3+Y_1$		-106.5	$-122.8+Y_4$			
		n261	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$			
		n262	$-120.3+Y_1$	-105.6	-103.6	$-118.8+Y_4$			
	Spherical coverage Note 1	n257	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$	$-112.4+Z_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-3
		n258	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$	$-112.6+Z_5$		
		n259			-92.7				
		n260	$-114.3+Z_1$		-93.9	$-110.8+Z_4$			
		n261	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$			
		n262	$-112.3+Z_1$	-93.7	-90.5	$-106.7+Z_4$			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.1-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, and 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.4.2 Conditions for CSI-RS based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on CSI-RS: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.2-2 for FR2 NR cells.

Table B.2.4.2-1: Conditions for CSI-RS based L1-RSRP measurements in FR1

Parameter	NR operating band groups Note1	Minimum CSI-RS_RP			CSI-RS Ês/Iot
		dBm / SCS_{CSI-RS}			dB
		SCS_{CSI-RS} = 15 kHz	SCS_{CSI-RS} = 30 kHz	SCS_{CSI-RS} = 60 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	-118	≥ -3
	NR_FDD_FR1_B	-123.5	-120.5	-117.5	
	NR_TDD_FR1_C	-123	-120	-117	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	-116.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	-116	
	NR_FDD_FR1_F	-121.5	-118.5	-115.5	
	NR_FDD_FR1_G	-121	-118	-115	
	NR_FDD_FR1_H	-120.5	-117.5	-114.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.					

Table B.2.4.2-2: Conditions for CSI-RS based L1-RSRP measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum CSI-RS_RP Note 2, Note 3						CSI-RS Ês/Iot
			dBm / SCS_{CSI-RS}						dB
			SCS_{CSI-RS} = 60 kHz					SCS_{CSI-RS} = 120 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	$-123.4+Y_5$	(Value for SCS_{CSI-RS} = 60 kHz) +3dB	≥-3
		n258	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	$-123.6+Y_5$		
		n259			-108.5				
		n260	$-125.3+Y_1$		-109.5	$-125.8+Y_4$			
		n261	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$			
		n262	$-123.3+Y_1$	-108.6	-106.6	$-121.8+Y_4$			
	Spherical coverage Note 1	n257	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	$-115.4+Z_5$	(Value for SCS_{CSI-RS} = 60 kHz) +3dB	≥-3
		n258	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	$-115.6+Z_5$		
		n259			-95.7				
		n260	$-117.3+Z_1$		-96.9	$-113.8+Z_4$			
		n261	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$			
		n262	$-115.1+Z_1$	-96.7	-93.5	$-109.7+Z_4$			
NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise. NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].									

Editor's notes for Table B.2.4.2-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP		SSB Ês/Iot
		dBm / SCS_{SSB}		dB
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A	-125	-122	≥ -4
	NR_FDD_FR1_B	-124.5	-121.5	
	NR_TDD_FR1_C	-124	-121	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_F	-122.5	-119.5	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot
			dBm / SCS_{SSB}						dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-126.3+Y_1$	-111.8	-110.1	$-125.8+Y_4$	$-121.4+Y_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-4
		n258	$-126.3+Y_1$	-111.8	-110.1	$-125.8+Y_4$	$-121.6+Y_5$		
		n259			-106.5				
		n260	$-123.3+Y_1$		-107.5	$-123.8+Y_4$			
		n261	$-126.3+Y_1$	-111.8	-110.1	$-125.8+Y_4$			
		n262	$-121.3+Y_1$	-106.6	-104.6	$-119.8+Y_4$			
	Spherical coverage Note 1	n257	$-118.3+Z_1$	-100.8	-99.2	$-116.8+Z_4$	$-113.4+Z_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-4
		n258	$-118.3+Z_1$	-100.8	-99.2	$-116.8+Z_4$	$-113.6+Z_5$		
		n259			-93.7				
		n260	$-115.3+Z_1$		-94.9	$-111.8+Z_4$			
		n261	$-118.3+Z_1$	-100.8	-99.2	$-116.8+Z_4$			
		n262	$-113.1+Z_1$	-94.7	-91.5	$-107.7+Z_4$			
NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise. NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].									

Editor's notes for Table B.2.5.2-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.6 Void

B.2.6.1 Void

Table B.2.6.1-1: Void

Table B.2.6.1-2: Void

B.2.6.2 Void

B.2.7 Conditions for SRS-RSRP measurements

This clause defines the following conditions for SRS-RSRP measurement and corresponding procedures performed based on SRSs: SRS_RP and SRS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.7-1 for FR1 NR cells.

The conditions are defined in Table B.2.7-2 for FR2 NR cells.

Table B.2.7-1: Conditions for SRS-RSRP measurements in FR1

Parameter	NR operating band groups Note1	Minimum SRS_RP			SRS Ês/Iot
		dBm / SCS_{SRS}			dB
		SCS_{SRS} = 15 kHz	SCS_{SRS} = 30 kHz	SCS_{SRS} = 60 kHz	
Conditions	NR_TDD_FR1_A	-120	-117	-114	≥ 1
	NR_TDD_FR1_C	-119	-116	-113	
	NR_TDD_FR1_D	-118.5	-115.5	-112.5	
	NR_TDD_FR1_E	-118	-115	-112	
NOTE 1: NR operating band groups are defined in clause 3.5.2.					

Table B.2.7-2: Conditions for SRS-RSRP measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SRS_RP Note 2, Note 3						SRS Ês/Iot
			dBm / SCS_{SRS}						dB
			SCS_{SRS} = 60 kHz					SCS_{SRS} = 120 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	-124.5	-119.0	-115.3	-124.0	-119.6	(Value for SCS_{SRS} = 60 kHz) +3dB	≥1
		n258	-124.5	-119.0	-115.3	-124.0	-119.8		
		n260	-121.5		-112.7	-122.0			
		n261	-124.5	-119.0	-115.3	-124.0			
	Spherical coverage Note 1	n257	-116.5	-108.0	-104.4	-115.0	-111.6	(Value for SCS_{SRS} = 60 kHz) +3dB	≥1
		n258	-116.5	-108.0	-104.4	-115.0	-111.8		
		n260	-113.5		-100.1	-110.0			
		n261	-116.5	-108.0	-104.4	-115.0			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum SRS Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

B.2.8 Conditions for NR L1-SINR reporting

B.2.8.1 Conditions for L1-SINR reporting with CSI-RS based CMR and no dedicated IMR configured

This clause defines the following conditions for NR L1-SINR measurement reporting and corresponding procedures performed based on CSI-RSs: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.2.8.1-1 for FR1 NR cells.

The conditions defined in Table B.2.8.1-2 for FR2 NR cells.

Table B.2.8.1-1: Conditions for L1-SINR measurements with CSI-RS based CMR only in FR1

Parameter	NR operating band groups Note1	Minimum CSI-RS_RP			CSI-RS CMR Ês/Iot
		dBm / SCS$_{CSI-RS}$			dB
		SCS$_{CSI-RS}$ = 15 kHz	SCS$_{CSI-RS}$ = 30 kHz	SCS$_{CSI-RS}$ = 60 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	-118	≥ -3
	NR_FDD_FR1_B	-123.5	-120.5	-117.5	
	NR_TDD_FR1_C	-123	-120	-117	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	-116.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	-116	
	NR_FDD_FR1_F	-121.5	-118.5	-115.5	
	NR_FDD_FR1_G	-121	-118	-115	
	NR_FDD_FR1_H	-120.5	-117.5	-114.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.					

Table B.2.8.1-2: Conditions for L1-SINR measurements with CSI-RS based CMR only in FR2

Parameter	Angle of arrival	NR operating bands	Minimum CSI-RS_RP Note 2, Note 3						CSI-RS CMR Ês/Iot
			dBm / SCS$_{CSI-RS}$						dB
			SCS$_{CSI-RS}$ = 60 kHz					SCS$_{CSI-RS}$ = 120 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	$-123.4+Y_5$	(Value for SCS$_{CSI-RS}$ = 60 kHz) +3dB	≥-3
		n258	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	$-123.6+Y_5$		
		n259			-108.5		$-120.5+Y_5$		
		n260	$-125.3+Y_1$		-109.5	$-125.8+Y_4$			
		n261	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$			
	Spherical coverage Note 1	n257	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	$-115.4+Z_5$	(Value for SCS$_{CSI-RS}$ = 60 kHz) +3dB	≥-3
		n258	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	$-115.6+Z_5$		
		n259			-95.7		$-112.5+Z_5$		
		n260	$-117.3+Z_1$		-96.9	$-113.8+Z_4$			
		n261	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$			
NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise. NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].									

B.2.8.2 Conditions for L1-SINR reporting with SSB based CMR and dedicated IMR configured

B.2.8.2.1 L1-SINR reporting with SSB based CMR and dedicated ZP-IMR configured

This clause defines the following conditions for NR L1-SINR measurement reporting and corresponding procedures performed based on SSBs and ZP-IMRs: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.2.8.2.1-1 for FR1 NR cells.

The conditions defined in Table B.2.8.2.1-2 for FR2 NR cells.

Table B.2.8.2.1-1: Conditions for L1-SINR measurements with SSB based CMR and ZP-IMR in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP		SSB Ês/Iot
		dBm / SCS_{SSB}		dB
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	≥ -3
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_F	-121.5	-118.5	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

Table B.2.8.2.1-2: Conditions for L1-SINR measurements with SSB based CMR and ZP-IMR in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot
			dBm / SCS_{SSB}						dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	-125.3+Y_1	-110.8	-109.1	-124.8+Y_4	-120.4+Y_5	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-3
		n258	-125.3+Y_1	-110.8	-109.1	-124.8+Y_4	-120.6+Y_5		
		n259			-105.5		-117.5+Y_5		
		n260	-122.3+Y_1		-106.5	-122.8+Y_4			
		n261	-125.3+Y_1	-110.8	-109.1	-124.8+Y_4			
	Spherical coverage Note 1	n257	-117.3+Z_1	-99.8	-98.2	-115.8+Z_4	-112.4+Z_5	(Value for SCS_{SSB} = 120 kHz) +3dB	≥-3
		n258	-117.3+Z_1	-99.8	-98.2	-115.8+Z_4	-112.6+Z_5		
		n259			-92.7		-109.5+Z_5		
		n260	-114.3+Z_1		-93.9	-110.8+Z_4			
		n261	-117.3+Z_1	-99.8	-98.2	-115.8+Z_4			
NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise. NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].									

B.2.8.2.2 L1-SINR reporting with SSB based CMR and dedicated NZP-IMR configured

This clause defines the following conditions for NR L1-SINR measurement reporting and corresponding procedures performed based on SSBs and NZP-IMRs: SSB_RP, SSB Ês/Iot and NZP-IMR Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.8.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.8.2.2-2 for FR2 NR cells.

Table B.2.8.2.2-1: Conditions for L1-SINR measurements with SSB based CMR and NZP-IMR in FR1

Parameter	NR operating band groups Note1	Minimum SSB_RP		SSB Ês/Iot	NZP-IMR Ês/Iot
		dBm / SCS_{SSB}		dB	dB
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz		
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	≥ 0	≥ 0
	NR_FDD_FR1_B	-120.5	-117.5		
	NR_TDD_FR1_C	-120	-117		
	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5		
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116		
	NR_FDD_FR1_F	-118.5	-115.5		
	NR_FDD_FR1_G	-118	-115		
	NR_FDD_FR1_H	-117.5	-114.5		

NOTE 1: NR operating band groups are defined in clause 3.5.2.

Table B.2.8.2.2-2: Conditions for L1-SINR measurements with SSB based CMR and NZP-IMR in FR2

Parameter	Angle of arrival	NR operating bands	Minimum SSB_RP Note 2, Note 3						SSB Ês/Iot	NZP-IMR Ês/Iot
			dBm / SCS_{SSB}						dB	dB
			SCS_{SSB} = 120 kHz					SCS_{SSB} = 240 kHz		
			UE Power class					UE Power class		
			1	2	3	4	5	1, 2, 3, 4, 5		
Conditions	Rx Beam Peak	n257	$-122.3+Y_1$	-107.8	-106.1	$-121.8+Y_4$	$-117.4+Y_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥0	≥0
		n258	$-122.3+Y_1$	-107.8	-106.1	$-121.8+Y_4$	$-117.6+Y_5$			
		n259			-102.5		$-114.5+Y_5$			
		n260	$-119.3+Y_1$		-103.5	$-119.8+Y_4$				
		n261	$-122.3+Y_1$	-107.8	-106.1	$-121.8+Y_4$				
	Spherical coverage Note 1	n257	$-114.3+Z_1$	-96.8	-95.2	$-112.8+Z_4$	$-109.4+Z_5$	(Value for SCS_{SSB} = 120 kHz) +3dB	≥0	≥0
		n258	$-114.3+Z_1$	-96.8	-95.2	$-112.8+Z_4$	$-109.6+Z_5$			
		n259			-88.7		$-106.5+Z_5$			
		n260	$-111.3+Z_1$		-90.9	$-107.8+Z_4$				
		n261	$-114.3+Z_1$	-96.8	-95.2	$-112.8+Z_4$				

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.8.2.2-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, and 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.8.3 Conditions for L1-SINR reporting with CSI-RS based CMR and dedicated IMR configured

B.2.8.3.1 L1-SINR reporting with CSI-RS based CMR and dedicated ZP-IMR configured

This clause defines the following conditions for NR L1-SINR measurement reporting and corresponding procedures performed based on CSI-RSs and ZP-IMRs: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.2.8.3.1-1 for FR1 NR cells.

The conditions defined in Table B.2.8.3.1-2 for FR2 NR cells.

Table B.2.8.3.1-1: Conditions for L1-SINR measurements with CSI-RS based CMR and ZP-IMR in FR1

Parameter	NR operating band groups Note1	Minimum CSI-RS_RP dBm / SCS_{CSI-RS}			CSI-RS Ês/Iot dB
		SCS_{CSI-RS} = 15 kHz	SCS_{CSI-RS} = 30 kHz	SCS_{CSI-RS} = 60 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	-118	≥ -3
	NR_FDD_FR1_B	-123.5	-120.5	-117.5	
	NR_TDD_FR1_C	-123	-120	-117	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	-116.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	-116	
	NR_FDD_FR1_F	-121.5	-118.5	-115.5	
	NR_FDD_FR1_G	-121	-118	-115	
	NR_FDD_FR1_H	-120.5	-117.5	-114.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.					

Table B.2.8.3.1-2: Conditions for L1-SINR measurements with CSI-RS based CMR and ZP-IMR in FR2

Parameter	Angle of arrival	NR operating bands	Minimum CSI-RS_RP Note 2, Note 3 dBm / SCS_{CSI-RS}						CSI-RS Ês/Iot dB
			SCS_{CSI-RS} = 60 kHz					SCS_{CSI-RS} = 120 kHz	
			UE Power class					UE Power class	
			1	2	3	4	5	1, 2, 3, 4, 5	
Conditions	Rx Beam Peak	n257	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	$-123.4+Y_5$	(Value for SCS_{CSI-RS} = 60 kHz) +3dB	≥-3
		n258	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	$-123.6+Y_5$		
		n259			-108.5		$-120.5+Y_5$		
		n260	$-125.3+Y_1$		-109.5	$-125.8+Y_4$			
		n261	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$			
	Spherical coverage Note 1	n257	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	$-115.4+Z_5$	(Value for SCS_{CSI-RS} = 60 kHz) +3dB	≥-3
		n258	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	$-115.6+Z_5$		
		n259			-95.7		$-112.5+Z_5$		
		n260	$-117.3+Z_1$		-96.9	$-113.8+Z_4$			
		n261	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

B.2.8.3.2 L1-SINR reporting with CSI-RS based CMR and dedicated NZP-IMR configured

This clause defines the following conditions for NR L1-SINR measurement reporting and corresponding procedures performed based on CSI-RSs and NZP-IMRs: CSI-RS_RP, CSI-RS Ês/Iot and NZP-IMR Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.8.3.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.8.3.2-2 for FR2 NR cells.

Table B.2.8.3.2-1: Conditions for L1-SINR measurements with CSI-RS based CMR and NZP-IMR in FR1

Parameter	NR operating band groups Note1	Minimum CSI-RS_RP			CSI-RS Ês/Iot	NZP-IMR Ês/Iot
		dBm / SCS_{SSB}			dB	dB
		SCS_{CSI-RS} = 15 kHz	SCS_{CSI-RS} = 30 kHz	SCS_{CSI-RS} = 60 kHz		
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	≥ 0	≥ 0
	NR_FDD_FR1_B	-120.5	-117.5	-114.5		
	NR_TDD_FR1_C	-120	-117	-114		
	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5		
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113		
	NR_FDD_FR1_F	-118.5	-115.5	-112.5		
	NR_FDD_FR1_G	-118	-115	-112		
	NR_FDD_FR1_H	-117.5	-114.5	-111.5		
NOTE 1: NR operating band groups are defined in clause 3.5.2.						

Table B.2.8.3.2-2: Conditions for L1-SINR measurements with CSI-RS based CMR and NZP-IMR in FR2

Parameter	Angle of arrival	NR operating bands	Minimum CSI-RS_RP Note 2, Note 3						CSI-RS Ês/Iot	NZP-IMR Ês/Iot
			dBm / SCS_{CSI-RS}						dB	dB
			SCS_{CSI-RS} = 60 kHz					SCS_{CSI-RS} = 120 kHz		
			UE Power class					UE Power class		
			1	2	3	4	5	1, 2, 3, 4, 5		
Conditions	Rx Beam Peak	n257	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$	$-120.4+Y_5$	(Value for SCS_{CSI-RS} = 60 kHz) +3dB	≥0	≥0
		n258	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$	$-120.6+Y_5$			
		n259			-105.5		$-117.5+Y_5$			
		n260	$-122.3+Y_1$		-106.5	$-122.8+Y_4$				
		n261	$-125.3+Y_1$	-110.8	-109.1	$-124.8+Y_4$				
	Spherical coverage Note 1	n257	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$	$-112.4+Z_5$	(Value for SCS_{CSI-RS} = 60 kHz) +3dB	≥0	≥0
		n258	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$	$-112.6+Z_5$			
		n259			-92.7		$-109.5+Z_5$			
		n260	$-114.3+Z_1$		-93.9	$-110.8+Z_4$				
		n261	$-117.3+Z_1$	-99.8	-98.2	$-115.8+Z_4$				
NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met. NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise. NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].										

Editor's notes for Table B.2.8.3.2-2:

- The value of Y for power classes 1, 4 and 5 is FFS, where Y_1, Y_4 and Y_5 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1, 4 and 5 respectively

- The value of Z for power classes 1, 4 and 5 is FFS, where Z_1, Z_4 and Z_5 are the rough/fine beam gain differences in spherical coverage directions for power classes 1, 4 and 5 respectively

B.2.9 Conditions for NR intra-frequency measurements under CCA

This clause defines the following conditions for NR intra-frequency measurements unde CCA and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.9-1 for NR cells under CCA.

Table B.2.9-1: Conditions for intra-frequency measurements under CCA

Parameter	NR operating band groups Note1	Minimum SSB_RP dBm / SCS_{SSB}		SSB Ês/Iot
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	dB
Conditions	NR_CCA_FR1_I	-123	-120	≥ -6
	NR_CCA_FR1_J	-122.5	-119.5	
NOTE 1: NR operating band groups are as defined in clause 3.5.2.				

B.2.10 Conditions for NR inter-frequency measurements under CCA

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.10-1 for NR cells under CCA.

Table B.2.10-1: Conditions for inter-frequency measurements under CCA

Parameter	NR operating band groups Note1	Minimum SSB_RP dBm / SCS_{SSB}		SSB Ês/Iot
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	dB
Conditions	NR_CCA_FR1_I	-121	-118	≥ -4
	NR_CCA_FR1_J	-120.5	-117.5	
NOTE 1: NR operating band groups are as defined in clause 3.5.2.				

B.2.11 Conditions for NR L1-RSRP reporting under CCA

B.2.11.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs under CCA: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.11.1-1 for NR cells under CCA.

Table B.2.11.1-1: Conditions for SSB based L1-RSRP measurements under CCA

Parameter	NR operating band groups Note1	Minimum SSB_RP dBm / SCS_{SSB}		SSB Ês/Iot
		SCS_{SSB} = 15 kHz	SCS_{SSB} = 30 kHz	dB
Conditions	NR_CCA_FR1_I	-120	-117	≥ -3
	NR_CCA_FR1_J	-119.5	-116.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.				

B.2.12 Conditions for NR CSI-RS based intra-frequency measurements

This clause defines the following conditions for NR CSI-RS based intra-frequency measurements and corresponding procedures performed based on CSI-RS: CSI_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.12-1 for FR1 NR cells.

The conditions are defined in Table B.2.12-2 for FR2 NR cells.

Table B.2.12-1: Conditions for CSI-RS based intra-frequency measurements in FR1

Parameter	NR operating band groups Note1	Minimum CSI_RP dBm / SCS_{CSI-RS}			CSI-RS Ês/Iot
		SCS_{CSI-RS} = 15 kHz	SCS_{CSI-RS} = 30 kHz	SCS_{CSI-RS} = 60 kHz	dB
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124	-121	≥ -6
	NR_FDD_FR1_B	-126.5	-123.5	-120.5	
	NR_TDD_FR1_C	-126	-123	-120	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	-119.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122	-119	
	NR_FDD_FR1_F	-124.5	-121.5	-118.5	
	NR_FDD_FR1_G	-124	-121	-118	
	NR_FDD_FR1_H	-123.5	-120.5	-117.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.					

Table B.2.12-2: Conditions for CSI-RS based intra-frequency measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum CSI_RP Note 2, Note 3 dBm / SCS_{CSI-RS}					CSI-RS Ês/Iot
			SCS_{CSI-RS} = 120 kHz				SCS_{CSI-RS} = 60 kHz	dB
			UE power class				UE power class	
			1	2	3	4	1, 2, 3, 4	
Conditions	Rx Beam Peak	n257	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$	(Value for SCS_{CSI-RS} = 120 kHz) - 3dB	≥-6
		n258	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$		
		n259			-108.5	$-124.7+Y_4$		
		n260	$-125.3+Y_1$		-109.5	$-125.8+Y_4$		
		n261	$-128.3+Y_1$	-113.8	-112.1	$-127.8+Y_4$		
	Spherical coverage Note 1	n257	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$	(Value for SCS_{CSI-RS} = 120 kHz) - 3dB	≥-6
		n258	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$		
		n259			-95.7	$-115.7+Z_4$		
		n260	$-117.3+Z_1$		-96.9	$-113.8+Z_4$		
		n261	$-120.3+Z_1$	-102.8	-101.2	$-118.8+Z_4$		

Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
Note 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise.
Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.12-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z_1 and Z_4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.13 Conditions for NR CSI-RS based inter-frequency measurements

This clause defines the following conditions for NR CSI-RS based inter-frequency measurements and corresponding procedures performed based on CSI-RS: CSI_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.13-1 for FR1 NR cells.

The conditions are defined in Table B.2.13-2 for FR2 NR cells.

Table B.2.13-1: Conditions for CSI-RS based inter-frequency measurements in FR1

Parameter	NR operating band groups Note1	Minimum CSI_RP			CSI-RS Ês/Iot
		dBm / SCS_{CSI-RS}			dB
		SCS_{CSI-RS} = 15 kHz	SCS_{CSI-RS} = 30 kHz	SCS_{CSI-RS} = 60 kHz	
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122	-119	≥ -6
	NR_FDD_FR1_B	-124.5	-121.5	-118.5	
	NR_TDD_FR1_C	-124	-121	-118	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	-117.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	-117	
	NR_FDD_FR1_F	-122.5	-119.5	-116.5	
	NR_FDD_FR1_G	-122	-119	-116	
	NR_FDD_FR1_H	-121.5	-118.5	-115.5	
NOTE 1: NR operating band groups are defined in clause 3.5.2.					

Table B.2.13-2: Conditions for CSI-RS based inter-frequency measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum CSI_RP Note 2, Note 3					CSI-RS Ês/Iot
			dBm / SCS_{CSI-RS}					dB
			SCS_{CSI-RS} = 120 kHz				SCS_{CSI-RS} = 60 kHz	
			UE power class				UE power class	
			1	2	3	4	1, 2, 3, 4	
Conditions	Rx Beam Peak	n257	-126.3+Y_1	-111.8	-110.1	-125.8+Y_4	(Value for SCS_{CSI-RS} = 120 kHz) - 3dB	≥-4
		n258	-126.3+Y_1	-111.8	-110.1	-125.8+Y_4		
		n259			-106.5	-122.7+Y_4		
		n260	-123.3+Y_1		-107.5	-123.8+Y_4		
		n261	-126.3+Y_1	-111.8	-110.1	-125.8+Y_4		
	Spherical coverage Note 1	n257	-118.3+Z_1	-100.8	-99.2	-116.8+Z_4	(Value for SCS_{CSI-RS} = 120 kHz) - 3dB	≥-4
		n258	-118.3+Z_1	-100.8	-99.2	-116.8+Z_4		
		n259			-93.7	-113.7+Z_4		
		n260	-115.3+Z_1		-94.9	-111.8+Z_4		
		n261	-118.3+Z_1	-100.8	-99.2	-116.8+Z_4		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.13-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z_1, and Z_4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively.

B.2.14 Conditions for NR PRS-based measurements

This clause defines the following conditions for NR PRS-based measurements and corresponding procedures performed based on PRS: PRP and PRS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.14-1 for FR1 NR cells.

The conditions are defined in Table B.2.14-2 for FR2 NR cells.

Table B.2.14-1: Conditions for NR PRS-based measurements in FR1

Parameter	NR operating band groups [Note1]	Minimum PRP1,2 dBm / SCS_{PRS}			PRS Ês/Iot
		SCS_{PRS} = 15 kHz	SCS_{PRS} = 30 kHz	SCS_{PRS} = 60 kHz	dB
Conditions	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124	-121	≥ -6 [Note2] ≥ -13 [Note3]
	NR_FDD_FR1_B	-126.5	-123.5	-120.5	
	NR_TDD_FR1_C	-126	-123	-120	
	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	-119.5	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122	-119	
	NR_FDD_FR1_F	-124.5	-121.5	-118.5	
	NR_FDD_FR1_G	-124	-121	-118	
	NR_FDD_FR1_H	-123.5	-120.5	-117.5	

NOTE 1: NR operating band groups are defined in clause 3.5.2.
NOTE 2: PRS Ês/Iot for RSTD measurement reference cell PRS resource, FFS for PRS-RSRP and UE Rx-Tx.
NOTE 3: PRS Ês/Iot for RSTD measurement neighbor cell PRS resource, FFS for PRS-RSRP and UE Rx-Tx.

Table B.2.14-2: Conditions for NR PRS-based measurements in FR2

Parameter	Angle of arrival	NR operating bands	Minimum PRP1,2 [Note 2, Note 3] dBm / SCS_{PRS}					PRS Ês/Iot
			SCS_{PRS} = 120 kHz				SCS_{PRS} = 60 kHz	dB
			UE power class				UE power class	
			1	2	3	4	1, 2, 3, 4	
Conditions	Rx Beam Peak	n257	-128.3+Y_1	-113.8	-112.1	-127.8+Y_4	(Value for SCS_{PRS} = 120 kHz) - 3dB	≥ -6 [Note4] ≥ -13 [Note5]
		n258	-128.3+Y_1	-113.8	-112.1	-127.8+Y_4		
		n259			-108.5	-124.7+Y_4		
		n260	-125.3+Y_1		-109.5	-125.8+Y_4		
		n261	-128.3+Y_1	-113.8	-112.1	-127.8+Y_4		
	Spherical coverage [Note 1]	n257	-120.3+Z_1	-102.8	-101.2	-118.8+Z_4	(Value for SCS_{PRS} = 120 kHz) - 3dB	≥ -6 [Note4] ≥ -13 [Note5]
		n258	-120.3+Z_1	-102.8	-101.2	-118.8+Z_4		
		n259			-95.7	-115.7+Z_4		
		n260	-117.3+Z_1		-96.9	-113.8+Z_4		
		n261	-120.3+Z_1	-102.8	-101.2	-118.8+Z_4		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
NOTE 2: Values specified at the Reference point to give minimum PRS Ês/Iot, with no applied noise.
NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].
NOTE 4: PRS Ês/Iot for RSTD measurement reference cell PRS resource, FFS for PRS-RSRP and UE Rx-Tx.
NOTE 5: PRS Ês/Iot for RSTD measurement neighbor cell PRS resource, FFS for PRS-RSRP and UE Rx-Tx.

Editor's notes for Table B.2.14-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z_1 and Z_4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.3 RRM Requirements Exceptions

B.3.1 Introduction

Annex B.3 covers exceptions for side conditions based on receiver sensitivity for CA, DC, and SUL.

B.3.2 Receiver sensitivity relaxation for CA

B.3.2.1 Receiver sensitivity relaxation for UE supporting CA in FR1

For a UE supporting inter-band carrier aggregation configuration with uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}$>0 dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta = \Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting CA configuration in FR1, the requirement in this clause applies for both SC and CA operation.

B.3.2.2 Receiver sensitivity relaxation for UE configured with CA in FR1

B.3.2.2.1 Inter-band carrier aggregation

For a UE configured with inter-band carrier aggregation with active uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}$>0 dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta = \Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.2 Reference sensitivity exceptions due to UL harmonic interference for CA

In this clause, requirements exceptions are described for the UE configured with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same CA configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ=L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.4 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different NR bands are configured with CA and active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3A.4 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3A.4 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.3 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

In this clause, requirements exceptions are described for the UE with an inter-band carrier aggregation with uplink assigned to two NR bands.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ=L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.5 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different bands are configured with CA and active,
- uplinks are assigned to two NR bands,
- the exception requirements specified in clause 7.3A.5 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

B.3.2.4 Receiver sensitivity relaxation for UE configured with CA in FR2

B.3.2.4.1 Intra-band contiguous carrier aggregation

For a UE configured with intra-band contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity ΔR_{IB}>0 dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.2.4.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity ΔR_{IB}>0 dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.3 Receiver sensitivity relaxation for DC

B.3.3.1 Receiver sensitivity relaxation for EN-DC

Editor's note: TBD

B.3.3.2 Receiver sensitivity relaxation for NE-DC

Editor's note: TBD

B.3.4 Receiver sensitivity relaxation for SUL

B.3.4.1 Receiver sensitivity relaxation for UE supporting SUL in FR1

For a UE supporting a SUL configuration in FR1, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}$>0 dB as defined in clause 7.3C.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting a SUL configuration in FR1, the requirement in this clause applies for both SC and SUL operation.

B.3.4.2 Receiver sensitivity relaxation for UE configured with SUL in FR1

B.3.4.2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL

In this clause, requirements exceptions are described for the UE with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same SUL configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ=L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3C.2 of TS 38.101-1 [18], when the following conditions are fulfilled,

- a downlink component carrier is configured in NR band and is active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3C.2 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3C.2 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.4.1 should not be applied.

B.4 Conditions for V2X

B.4.1 Test parameters for GNSS signals

This clause defines the reference signal power levels of generated salellites for a corresponding GNSS, which will be used in V2X test cases.

Table B.4.1-1: GNSS Referenece Signal Power Parameters

System	Parameters	Unit	Value
	Number of generated satellites per system	-	6
GPS(1)	Reference signal power level for all satellites	dBm	-128.5
Galileo	Reference signal power level for all satellites	dBm	-127
GLONASS	Reference signal power level for all satellites	dBm	-131
BDS	Reference signal power level for all satellites	dBm	-133
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on UE capabilities. NOTE 2: The DUT UE does not need to support all systems. The DUT UE shall support at least one system and will be test for the supported systems.			

B.4.2 Conditions for PSBCH-RSRP Accuracy Requirements

This clause defines the following conditions for PSBCH-RSRP measurement accuracy requirements applicable for a corresponding operating band.

The conditions are defined in Table B.4.2-1 for FR1.

Table B.4.2-1: Conditions for PSBCH-RSRP measurements in FR1

Parameter	NR V2X operating band groups Note1	Minimum S-SSB_RP			S-SSB Ês/Iot
		dBm/$SCS_{S\text{-}SSB}$			dB
		$SCS_{S\text{-}SSB}$ = 15kHz	$SCS_{S\text{-}SSB}$ = 30kHz	$SCS_{S\text{-}SSB}$ = 60kHz	
	NR_TDD_FR1_B	-126.5	-123.5	-120.5	≥ -6
	NR_TDD_FR1_J	-122.5	-119.5	-116.5	
NOTE 1: NR V2X operating band groups are as defined in Section 3.5 for the corresponding NR operating bands.					

B.4.3 Conditions for Selection/Reselection to Intra-frequency SyncRef UE

This clause defines the S-SSB_RP and S-SSB Ês/Iot applicable for a corresponding operating band.

The conditions for selection/reselection to intra-frequency SyncRef UE are defined in Table B.4.3-1 for FR1.

Table B.4.3-1: V2X synchronization measurements in FR1

Parameter	NR V2X operating band groups Note1	Minimum S-SSB_RP			S-SSB Ês/Iot
		dBm/$SCS_{S\text{-}SSB}$			dB
		$SCS_{S\text{-}SSB}$ = 15kHz	$SCS_{S\text{-}SSB}$ = 30kHz	$SCS_{S\text{-}SSB}$ = 60kHz	
	NR_TDD_FR1_B	-120.5	-117.5	-114.5	≥ 0
	NR_TDD_FR1_J	-116.5	-113.5	-110.5	≥ 0
NOTE 1: NR V2X operating band groups are as defined in Section 3.5 for the corresponding NR operating bands.					

B.4.4 Conditions for L1 SL-RSRP Accuracy Requirements

This clause defines the following condtions for L1 SL-RSRP measurement accuracy requirements applicable for a corresponding operating band.

The conditions are defined in Table B.4.4-1 for FR1.

Table B.4.4-1: Conditions for L1 SL-RSRP measurements in FR1

Parameter	NR V2X operating band groups Note1	Minimum L1 SL-RSRP			Ês/Iot
		dBm/SCS			dB
		SCS= 15kHz	SCS= 30kHz	SCS = 60kHz	
	NR_TDD_FR1_B	-120.5	-117.5	-114.5	≥ 0
	NR_TDD_FR1_J	-116.5	-113.5	-110.5	
NOTE 1: NR V2X operating band groups are as defined in Section 3.5 for the corresponding NR operating bands. NOTE 2: The parameter Ês/Iot is the Ês/Iot of PSCCH-DMRS and/or PSSCH-DMRS. NOTE 3: The SCS is for PSCCH and/or PSSCH.					

Annex C (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-05	RAN4#83	R4-1706324				Specification skeleton	0.0.1
2017-09						Email approved	0.1.0
2017-09	RAN4-NR AH #3	R4-1709413				Capture TPs approved in the meeting	0.2.0
2017-10	RAN4#84 -Bis	R4-1711985				Capture TPs approved in the meeting	0.3.0
2017-12	RAN4#85	R4-1714546				Capture TPs approved in RAN4#85	0.4.0
2017-12	RAN#78	RP-172407				v1.0.0 submitted for plenary approval	1.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180264	0032		B	CR to TS38.133	15.1.0
2018-06	RAN#80	RP-181075	0037		B	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87	15.2.0
2018-09	RAN#81	RP-181896	0043		B	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-AH-1807 and RAN4 #88	15.3.0
2018-12	RAN#82	RP-182763	0057	3	B	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-88bis and RAN4-89	15.4.0
2019-03	RAN#83	RP-190569	0064	1	B	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90	15.5.0
2019-06	RAN#84	RP-191240	0072	1	F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91	15.6.0
2019-06	RAN#84	RP-191248	0066		B	Introduction of band n48	16.0.0
2019-06	RAN#84	RP-191242	0067		B	Introduction of band n14 - CR to TS 38.133	16.0.0
2019-06	RAN#84	RP-191246	0068		B	Introduction of band n30 - CR to TS 38.133	16.0.0
2019-06	RAN#84	RP-191244	0069		B	introduce n18 into TS38.133	16.0.0
2019-06	RAN#84	RP-191250	0070	1	B	n65 introduction to 38.133	16.0.0
2019-09	RAN#85	RP-192034	0077		B	n29 introduction to 38.133	16.1.0
2019-09	RAN#85	RP-192022	0085		A	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#92 (Rel-16) - Mirrors changes in R4-1910356 for Rel-15 TS 38.133	16.1.0
2019-12	RAN#86	RP-192997	0093		A	Specification of UE antenna gain range	16.2.0
2019-12	RAN#86	RP-192992	0095	1	A	Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in non Rx beam peak	16.2.0
2019-12	RAN#86	RP-192997	0097		A	Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	16.2.0
2019-12	RAN#86	RP-192997	0099		A	Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	16.2.0
2019-12	RAN#86	RP-192997	0101		A	Update of Parameters, Test case A.7.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	16.2.0
2019-12	RAN#86	RP-192997	0103		A	Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	16.2.0
2019-12	RAN#86	RP-192992	0105		A	Correction to Random access test case in FR1 for PSCell in EN-DC	16.2.0
2019-12	RAN#86	RP-193040	0107		A	CR on handover 38.133 - R16	16.2.0
2019-12	RAN#86	RP-192994	0112	1	A	CR on the BWP switch test cases EN-DC FR1 (clause A.4.5.6)	16.2.0
2019-12	RAN#86	RP-192994	0113	1	A	CR on the BWP switch test cases EN-DC FR2 (clause A.5.5.6)	16.2.0
2019-12	RAN#86	RP-192994	0114	1	A	CR on the BWP switch test cases SA FR1 (clause A.6.5.6)	16.2.0
2019-12	RAN#86	RP-192994	0115	1	A	CR on the BWP switch test cases SA FR2 (clause A.7.5.6)	16.2.0
2019-12	RAN#86	RP-193042	0117		A	CR to TS38.133 on correction for BWP switching with SCS changing (Section 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)	16.2.0
2019-12	RAN#86	RP-193040	0121		A	CR on handover RRM requirement (clause 6.1.1.5) (R16)	16.2.0
2019-12	RAN#86	RP-192994	0123		A	CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.5.6.2) (R16)	16.2.0
2019-12	RAN#86	RP-192994	0127	1	A	CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R16)	16.2.0
2019-12	RAN#86	RP-192994	0129	1	A	CR on test cases for FR2 handover (clause A.7.3.1) (R16)	16.2.0
2019-12	RAN#86	RP-193042	0131		A	CR to 38.133 on TCI state switching (Section 8.10) (R16)	16.2.0
2019-12	RAN#86	RP-193009	0133		F	CR on measurement gap applicability requirement for SRVCC	16.2.0
2019-12	RAN#86	RP-192994	0137		A	CR on TC with monitoring PDCCH not in first 3 OFDM symbols R16	16.2.0
2019-12	RAN#86	RP-193021	0139		F	CR to add n90 in the NR operating bands in FR1 (3.5.2)	16.2.0
2019-12	RAN#86	RP-193040	0148	1	A	CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)	16.2.0
2019-12	RAN#86	RP-193042	0151		A	CR to 38.133 R16 Add the missing units to DRX cycle values (Cat A)	16.2.0

2019-12	RAN#86	RP-193005	0152	1	B	CR for Abbreviations for cross link interference (clause 3)	16.2.0
2019-12	RAN#86	RP-193005	0153	1	B	CR for cross link interference measurements (clause 9)	16.2.0
2019-12	RAN#86	RP-193041	0156		A	CR on NR MTTD and MRTD definition for R16	16.2.0
2019-12	RAN#86	RP-193042	0157	1	A	Editorial correction for SCell activation and deactivation delay	16.2.0
2019-12	RAN#86	RP-193039	0159		A	CR for SCell activation delay in FR2	16.2.0
2019-12	RAN#86	RP-193040	0161		A	CR for scheduling restriction due to L1-RSRP measurement	16.2.0
2019-12	RAN#86	RP-192993	0167		A	CR on SSB setting for new gap and SMTC setting (Section A.3.10)	16.2.0
2019-12	RAN#86	RP-192995	0169		A	CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Section A.4.7.3)	16.2.0
2019-12	RAN#86	RP-192995	0171		A	CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Section A.6.7.3)	16.2.0
2019-12	RAN#86	RP-192993	0185		A	CR on cell-reselection test cases for NR SA FR2 R16	16.2.0
2019-12	RAN#86	RP-192995	0187		A	endorsed CR on intra-frequency measurement and reporting for EN-DC FR2 R16	16.2.0
2019-12	RAN#86	RP-192996	0189		A	endorsed CR on intra-frequency measurement and reporting for NR SA FR2 R16	16.2.0
2019-12	RAN#86	RP-192996	0191		A	endorsed CR on RLM scheduling restrictions for EN-DC FR2 R16	16.2.0
2019-12	RAN#86	RP-192996	0193		A	endorsed CR on RLM scheduling restrictions for NR SA FR2 R16	16.2.0
2019-12	RAN#86	RP-192992	0201		A	Correction to PRACH configuration index in test cases_r16	16.2.0
2019-12	RAN#86	RP-193009	0205		B	CR on UMTS inter-RAT measurement requirements	16.2.0
2019-12	RAN#86	RP-193009	0206		B	CR on CSSF for SRVCC	16.2.0
2019-12	RAN#86	RP-193009	0207		B	CR on measurement capability for NR- UMTS for SRVCC	16.2.0
2019-12	RAN#86	RP-193039	0209		A	Correction on the TCI state switching (clause 8.10)	16.2.0
2019-12	RAN#86	RP-193039	0219		A	CR for 38133 editorial for clause 8.1,8.8,8.9,8.10,8.11 in Rel-16	16.2.0
2019-12	RAN#86	RP-193039	0220		A	CR for 38133 editorial for clause 8.5 in Rel-16	16.2.0
2019-12	RAN#86	RP-193039	0221		A	CR for 38133 editorial for clause 9.3 in Rel-16	16.2.0
2019-12	RAN#86	RP-193040	0222		A	CR on 38133 for removal the duplicated reference in clause 2	16.2.0
2019-12	RAN#86	RP-193040	0223		A	CR on 38133 for clause 11 in Rel-16	16.2.0
2019-12	RAN#86	RP-192994	0225	1	A	CR on TC of UE transmit timing (A.4.4.1.1, A.5.4.1.1, A.6.4.1.1, A.7.4.1.1) Rel-16	16.2.0
2019-12	RAN#86	RP-193042	0230		A	Update on requirements related to inter-band EN-DC and NE-DC synchronous requirements	16.2.0
2019-12	RAN#86	RP-193008	0231	1	B	MRTD and MTTD requirements for asynchronous NR-NR DC	16.2.0
2019-12	RAN#86	RP-192995	0233	1	A	Editorial corrections to measurement accuracy tests	16.2.0
2019-12	RAN#86	RP-192992	0235		A	Corrections to SS-RSRQ and SS-SINR OTA tests with SA	16.2.0
2019-12	RAN#86	RP-192992	0237	1	A	Corrections to SS-RSRQ and SS-SINR OTA tests with EN-DC	16.2.0
2019-12	RAN#86	RP-193042	0239	1	A	Editorial corrections to clause 9.2	16.2.0
2019-12	RAN#86	RP-193009	0240		B	Introduction of handover requirements for SRVCC in clause 6.1.2	16.2.0
2019-12	RAN#86	RP-192992	0242		A	Corrections to band applicability of measurement accuracy tests	16.2.0
2019-12	RAN#86	RP-192996	0244		A	Introduction of bandwidth limited OCNG for OTA testing	16.2.0
2019-12	RAN#86	RP-192992	0248		A	Corrections to test cases for SA FR2 inter-frequency measurement (clause A.7.6.2)	16.2.0
2019-12	RAN#86	RP-193041	0250		A	CR to 38.133 NR reporting criteria	16.2.0
2019-12	RAN#86	RP-192993	0264		A	CR on correcting CSI-RS based BFD and link recovery tests for EN-DC in FR1	16.2.0
2019-12	RAN#86	RP-192993	0266		A	CR on correcting CSI-RS based BFD and link recovery tests for SA in FR1	16.2.0
2019-12	RAN#86	RP-192993	0268		A	CR on correcting CSI-RS based BFD and link recovery tests for EN-DC in FR2	16.2.0
2019-12	RAN#86	RP-192993	0270		A	CR on correcting CSI-RS based BFD and link recovery tests for SA in FR2	16.2.0
2019-12	RAN#86	RP-193004	0274	1	B	CR on introducing L1-SINR mapping in TS38.133 R16	16.2.0
2019-12	RAN#86	RP-193040	0276		A	CR on delay uncertainty of RRC Release with redirection requirements in TS 38.133 (Cat A)	16.2.0
2019-12	RAN#86	RP-193040	0278		A	CR on known condition of PSCell addition requirement in NE-DC (Cat A)	16.2.0
2019-12	RAN#86	RP-193041	0280		A	CR on known condition of PSCell addition requirement in NR DC (Cat A)	16.2.0
2019-12	RAN#86	RP-193041	0282		A	CR on RRC Re-establishment requirements in TS 38.133 (Cat A)	16.2.0
2019-12	RAN#86	RP-193041	0284		A	CR on scope of interruption requirements of EN-DC in TS 38.133 (Cat A)	16.2.0
2019-12	RAN#86	RP-193041	0286		A	CR on scope of MTTD requirements in TS 38.133 (Cat A)	16.2.0
2019-12	RAN#86	RP-192994	0288		A	CR on SSB-based RLM test case for EN-DC FR1 (Cat A)	16.2.0
2019-12	RAN#86	RP-192994	0290		A	CR on SSB-based RLM test case for NR SA FR1 (Cat A)	16.2.0
2019-12	RAN#86	RP-193042	0292		A	Editorial CR on clause 8.2 (Cat A)	16.2.0
2019-12	RAN#86	RP-193041	0296		A	CR on NR inter-frequency identification (Cat A)	16.2.0
2019-12	RAN#86	RP-193041	0298		A	CR on NR intra-frequency measurements (Cat A)	16.2.0
2019-12	RAN#86	RP-193039	0312		A	Correction on CSSF within measurement gap (clause 9.1.5.2) (cat-A)	16.2.0
2019-12	RAN#86	RP-193041	0314		A	CR on RLM scheduling restriction (clause 8.1.7) (cat-A)	16.2.0
2019-12	RAN#86	RP-193041	0316		A	CR on SCell activation requirements (clause 8.3.2) (cat-A)	16.2.0
2019-12	RAN#86	RP-193042	0318		A	CR to add QCL definition (clause 3.6) (cat-A)	16.2.0
2019-12	RAN#86	RP-192993	0320		A	CR on power offset in TRS RMC (A.3.17) (cat-A)	16.2.0
2019-12	RAN#86	RP-192995	0322		A	CR to introduce new PDCCH RMC (A.3.1.3.2) (cat-A)	16.2.0

2019-12	RAN#86	RP-192997	0324		A	Maintenance CR for measurement accuracy (clause 10.1) (cat-A)	16.2.0
2019-12	RAN#86	RP-192996	0326		A	FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) (cat-A)	16.2.0
2019-12	RAN#86	RP-192996	0328		A	FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) (cat-A)	16.2.0
2019-12	RAN#86	RP-192996	0330		A	FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) (cat-A)	16.2.0
2019-12	RAN#86	RP-192996	0332		A	FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) (cat-A)	16.2.0
2019-12	RAN#86	RP-192997	0334		A	L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) (cat-A)	16.2.0
2019-12	RAN#86	RP-192997	0336		A	L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) (cat-A)	16.2.0
2019-12	RAN#86	RP-192997	0338		A	L1-RSRP delay test FR1 SA (clause A.6.6.4) (cat-A)	16.2.0
2019-12	RAN#86	RP-192997	0340		A	L1-RSRP delay test FR2 SA (clause A.7.6.3) (cat-A)	16.2.0
2019-12	RAN#86	RP-192996	0344		A	L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4) (cat-A)	16.2.0
2019-12	RAN#86	RP-192996	0346		A	L1-RSRP accuracy test FR2 SA (clause A.7.7.4) (cat-A)	16.2.0
2019-12	RAN#86	RP-193005	0347	1	B	CR to introduce CLI measurement accuracy requirements	16.2.0
2019-12	RAN#86	RP-193008	0348		B	CR on measurement gap interruption due to async NR-DC	16.2.0
2019-12	RAN#86	RP-193008	0349		B	CR on Interruptions at PSCell/SCell addition/release in async NR-DC	16.2.0
2019-12	RAN#86	RP-193008	0350		B	Introducing euCA related interruption requirements for EN-DC in 38.133 (clause 8.2.1)	16.2.0
2019-12	RAN#86	RP-193008	0351		B	Introducing euCA related interruption requirements for NE-DC in 38.133 (clause 8.2.3)	16.2.0
2019-12	RAN#86	RP-193008	0352	1	B	CR on direct SCell activation delay	16.2.0
2019-12	RAN#86	RP-193039	0358		A	CR 38.133 (8.3.2) Amendment of requirements depending on T_SMTC_Max	16.2.0
2019-12	RAN#86	RP-193039	0360		A	CR 38.133 (8.3.3) Correction of SCell deactivation delay	16.2.0
2019-12	RAN#86	RP-192992	0362	1	A	CR 38.133 (A.7.5.7) TCs for PSCell addition and release delay	16.2.0
2019-12	RAN#86	RP-192995	0366		A	CR to TS 38.133: New common clause with OTA related definitions for FR2 testing (Rel-16)	16.2.0
2019-12	RAN#86	RP-192995	0368		A	CR to TS 38.133: Configuration of NR FR1 cell in NR FR1-FR2 tests (Rel-16)	16.2.0
2019-12	RAN#86	RP-192995	0370		A	CR to TS 38.133: Clarificatins to Antenna Configurations for FR2 (Rel-16)	16.2.0
2019-12	RAN#86	RP-192995	0372		A	CR to TS 38.133: Corrections to CORESET RMCs (Rel-16)	16.2.0
2019-12	RAN#86	RP-192995	0374		A	CR to TS 38.133: Corrections to FR2 test configurations (Rel-16)	16.2.0
2019-12	RAN#86	RP-193042	0376	1	A	Editorial updates (clause 9.4)	16.2.0
2019-12	RAN#86	RP-193039	0378		A	Correction in interruption requirements (clause 8.2)	16.2.0
2019-12	RAN#86	RP-193042	0380	1	A	Editorial updates (Annex B)	16.2.0
2019-12	RAN#86	RP-193040	0382		A	CR on 38133 for MRTD and MTTD in intra-band EN-DC	16.2.0
2019-12	RAN#86	RP-193039	0390		A	Correction to the starting point of the DRX cycle length interval	16.2.0
2019-12	RAN#86	RP-192992	0391		A	CR for MAC-CE based TCI State switch for ENDC (Section A.5.5.8)	16.2.0
2019-12	RAN#86	RP-192993	0392		A	CR for MAC-CE based TCI State switch for NR SA (Section A.7.5.7)	16.2.0
2019-12	RAN#86	RP-192993	0393		A	CR for RRC based TCI State switch for NR SA (Section A.7.5.7)	16.2.0
2019-12	RAN#86	RP-192993	0394		A	CR for RRC based TCI State switch for EN-DC (Section A.5.5.8)	16.2.0
2019-12	RAN#86	RP-192992	0395		A	CR for FR1 handover test cases (Section A.6.3.1.1, A.6.3.1.2, A.6.3.1.3)	16.2.0
2019-12	RAN#86	RP-193041	0396		A	CR on MTTD for intra-band EN-DC	16.2.0
2019-12	RAN#86	RP-193040	0398		A	CR on corrections on NR intra frequency measurement reporting requirements (Section 9.2.4)	16.2.0
2020-03	RAN#87	RP-200401	0405	1	A	[CR] handover requirements 38.133 R16 (Cat A)	16.3.0
2020-03	RAN#87	RP-200401	0412	1	A	[CR] SCell activation delay 38.133 R16 (Cat A)	16.3.0
2020-03	RAN#87	RP-200401	0417		A	Corrections to RRM Test case A.7.1.1.2	16.3.0
2020-03	RAN#87	RP-200401	0419		A	Correction to Active UL BWP for SA intra-frequency event triggered reporting with per-UE gaps	16.3.0
2020-03	RAN#87	RP-200401	0421		A	Correction to FR1-E-UTRA Inter-RAT cell re-selection test cases	16.3.0
2020-03	RAN#87	RP-200401	0423		A	Removal of Time offset between PCell and PSCell in SA RRM Test cases	16.3.0
2020-03	RAN#87	RP-200401	0425		A	Correction to SRS periodicity and Offset for UL transit timing with DRx config	16.3.0
2020-03	RAN#87	RP-200401	0427		A	Update of Test Requirements, FR2 Intra-frequency SS-RSRP accuracy Test cases	16.3.0
2020-03	RAN#87	RP-200401	0429		A	Update of Test requirements, FR2 Inter-frequency SS-RSRP accuracy Test cases	16.3.0
2020-03	RAN#87	RP-200401	0439	1	A	CR on test cases for SA FR2 inter-frequency measurement R16 (section A.7.6.2)	16.3.0
2020-03	RAN#87	RP-200401	0441		A	Editorial corrections for 38.133 Core Part R16 (Cat A)	16.3.0
2020-03	RAN#87	RP-200401	0445	1	A	Editorial corrections for 38.133 Perf Part R16 (Cat A)	16.3.0
2020-03	RAN#87	RP-200401	0454		A	Editorial correction for active TCI state switching delay	16.3.0
2020-03	RAN#87	RP-200401	0462	1	A	Corrections for BWP switch delay R16 (Cat A)	16.3.0
2020-03	RAN#87	RP-200401	0464		A	CR for reference correction on L1-RSRP measurement period (section 9.5.3)	16.3.0

2020-03	RAN#87	RP-200401	0466		A	CR for measurement restriction in FR2 across CCs (section 8.1.2.3, 8.1.3.3, 8.5.2.3, 8.5.3.3, 8.5.5.3, 8.5.6.3, 9.5.5.1, 9.5.5.2)	16.3.0
2020-03	RAN#87	RP-200401	0468		A	CR for SSB based candidate beam detection (section 8.5.5.2)	16.3.0
2020-03	RAN#87	RP-200401	0488		A	CR to TS 38.133: Corrections to FR1-FR2 event triggered test cases Annex A.5 (Rel-16)	16.3.0
2020-03	RAN#87	RP-200401	0490		A	CR to TS 38.133: Corrections to FR1-FR2 event triggered test cases Annex A.7 (Rel-16)	16.3.0
2020-03	RAN#87	RP-200401	0492		A	CR to TS 38.133: Clarifications to AoA setup and AoA cell assignement Annex A.5 (Rel-16)	16.3.0
2020-03	RAN#87	RP-200401	0494		A	CR to TS 38.133: Clarifications to AoA setup Annex A.8 (Rel-16)	16.3.0
2020-03	RAN#87	RP-200401	0496		A	CR to TS 38.133: Addition of TC A.4.7.2.2 (Rel-16)	16.3.0
2020-03	RAN#87	RP-200401	0500		A	Editorial correction of EN-DC FR1 L1-RSRP measurement for beam reporting	16.3.0
2020-03	RAN#87	RP-200401	0502		A	Editorial correction of NR SA FR1 L1-RSRP measurement for beam reporting	16.3.0
2020-03	RAN#87	RP-200401	0509		A	CR on removing one-shot timing adjustment requirements (Cat A)	16.3.0
2020-03	RAN#87	RP-200401	0516		A	Correction to BWP switching delay_r16	16.3.0
2020-03	RAN#87	RP-200401	0518		A	Correction to inter-RAT measurement on LTE serving carrrier_r16	16.3.0
2020-03	RAN#87	RP-200401	0520		A	Correction to configurations for TRS_r16	16.3.0
2020-03	RAN#87	RP-200401	0522		A	Correction to FR1 SA inter-RAT measurement TCs_r16 NOTE The CR is not implemented because the corresponding Cat F CR is not implementable.	16.3.0
2020-03	RAN#87	RP-200401	0524		A	Correction to interruption TCs_r16 NOTE The CR is not implemented because the corresponding Cat F CR is not implementable.	16.3.0
2020-03	RAN#87	RP-200401	0528		A	Correction to RF channels configuration_r16	16.3.0
2020-03	RAN#87	RP-200401	0530		A	Correction to RRC release with redirection TCs_r16	16.3.0
2020-03	RAN#87	RP-200401	0532		A	Correction to UL reconfiguration delay TCs_r16	16.3.0
2020-03	RAN#87	RP-200401	0538		A	CR on SSB RLM test cases EN-DC R16	16.3.0
2020-03	RAN#87	RP-200401	0540		A	CR on SSB RLM test cases SA R16	16.3.0
2020-03	RAN#87	RP-200401	0542		A	CR on cell reselection test cases for FR2 SA R16	16.3.0
2020-03	RAN#87	RP-200401	0544		A	OCNG pattern for TDM-ed SSB R16	16.3.0
2020-03	RAN#87	RP-200401	0564		A	NR editorial correction	16.3.0
2020-03	RAN#87	RP-200401	0580		A	CR 38.133 (8.11) Corrections to PSCell change delay requirements	16.3.0
2020-03	RAN#87	RP-200401	0587		A	PRACH configurations in FR1 SSB based RLM tests	16.3.0
2020-03	RAN#87	RP-200401	0589		A	PRACH configurations in FR1 SSB based BFR tests	16.3.0
2020-03	RAN#87	RP-200375	0437	1	B	CR for Conditional PSCell addition/change RRM requirement	16.3.0
2020-03	RAN#87	RP-200381	0440		B	n26 introduction to 38.133	16.3.0
2020-03	RAN#87	RP-200374	0452	1	B	CR on interruption requirements for NR V2X	16.3.0
2020-03	RAN#87	RP-200372	0455		B	CR on RRM requirement for maximum MIMO layer adaptation	16.3.0
2020-03	RAN#87	RP-200389	0460	1	F	introduce n18 into TS38.133	16.3.0
2020-03	RAN#87	RP-200374	0473	1	B	CR of NR V2X RRM(introduction & reliability of GNSS signal)	16.3.0
2020-03	RAN#87	RP-200374	0476	2	B	CR on NR V2X initiation SLSS 38.133 -R16	16.3.0
2020-03	RAN#87	RP-200401	0479		F	CR to 38.133 NR reporting criteria	16.3.0
2020-03	RAN#87	RP-200382	0486		B	Introduction of n53 into 38.133	16.3.0
2020-03	RAN#87	RP-200371	0498		B	Updates to SA NR interruption requirements for NR-U	16.3.0
2020-03	RAN#87	RP-200401	0510		F	CR on inter-band EN-DC and NE-DC synchronous requirements	16.3.0
2020-03	RAN#87	RP-200375	0511	1	B	CR on DAPS handover requirements	16.3.0
2020-03	RAN#87	RP-200374	0512		B	CR on introducing UE sidelink timing requirements for NR V2X	16.3.0
2020-03	RAN#87	RP-200370	0545	1	F	CR on CLI measurement requirements	16.3.0
2020-03	RAN#87	RP-200370	0546	1	F	CR on CLI measurement accuracy requirements	16.3.0
2020-03	RAN#87	RP-200406	0547		B	CR on Interruptions at SCell activation/deactivation in async NR-DC	16.3.0
2020-03	RAN#87	RP-200406	0548	1	F	CR on direct SCell activation delay	16.3.0
2020-03	RAN#87	RP-200376	0551	1	F	Correction on handover requirements for SRVCC	16.3.0
2020-03	RAN#87	RP-200371	0558	1	B	CR to 38.133 to address NR-U inter-RAT measurements	16.3.0
2020-03	RAN#87	RP-200401	0578		F	CR 38.133 (8.3.2) Correction of error in Rel-16 SCell activation	16.3.0
2020-03	RAN#87	RP-200370	0582		B	CR for conditions for cross link interference measurements (section B)	16.3.0
2020-06	RAN#88	RP-200987	0595		A	[CR] Editorial corrections for 38.133 R16 Core Part - Cat A	16.4.0
2020-06	RAN#88	RP-200987	0596		F	[CR] Editorial corrections for 38.133 R16 Core Part - Cat F	16.4.0
2020-06	RAN#88	RP-200987	0598		A	[CR] Editorial corrections for 38.133 R16 Perf Part - Cat A	16.4.0
2020-06	RAN#88	RP-200966	0599		F	[CR] Delay requirements for direct SCell activation	16.4.0
2020-06	RAN#88	RP-200987	0600		F	[CR] Editorial corrections for 38.133 R16 Perf Part - Cat F	16.4.0
2020-06	RAN#88	RP-200987	0602		A	CR to Intra-frequency handover from FR1 to FR1	16.4.0
2020-06	RAN#88	RP-200987	0606		A	CR to A.6.1.2.1 Cell reselection to higher priority E-UTRAN	16.4.0
2020-06	RAN#88	RP-200987	0608		A	Correction to General test parameters in A.6.6.1.2	16.4.0
2020-06	RAN#88	RP-200987	0620		A	CR on CSSF correction for R16 TS38.133	16.4.0
2020-06	RAN#88	RP-201047	0625	1	B	CR on multiple SCell activation deactivation requirement for R16	16.4.0

2020-06	RAN#88	RP-201047	0626	1	B	CR on multiple SCell activation interruption requirement for R16	16.4.0
2020-06	RAN#88	RP-200987	0629		A	CR on Active TCI State Switching requirements - Rel16	16.4.0
2020-06	RAN#88	RP-201055	0632	2	F	Rapportuer CR for TS38.133	16.4.0
2020-06	RAN#88	RP-201048	0635	2	B	CR on minimum requirement at transition period for UE power saving	16.4.0
2020-06	RAN#88	RP-200958	0636	1	F	CR on interruption requirements for NR V2X	16.4.0
2020-06	RAN#88	RP-200975	0641	1	B	CR on cell identification requirements for NR HST	16.4.0
2020-06	RAN#88	RP-201044	0642	2	B	CR on PRS-RSRP measurement report mapping	16.4.0
2020-06	RAN#88	RP-201044	0645	1	B	CR on SRS RSRP measurement report mapping	16.4.0
2020-06	RAN#88	RP-200973	0646	2	B	CR to TS38.133 on introduction of L1-SINR Measurement Requirement (Section 3.3 and 9)	16.4.0
2020-06	RAN#88	RP-200973	0648	1	B	CR to TS38.133 on introduction of SCell BFRQ Procedure (Section 8.5)	16.4.0
2020-06	RAN#88	RP-200987	0651		A	Add UE Beam assumption for RRM Test cases in A.7.3, A.7.4, A.7.7	16.4.0
2020-06	RAN#88	RP-200987	0653		A	Add UE Beam assumption for RRM Test cases in A.5.3, A.5.4, A.5.7	16.4.0
2020-06	RAN#88	RP-200987	0655		A	Update of FR2 RLM Test cases with 2 Angles of Arrival	16.4.0
2020-06	RAN#88	RP-200987	0657		F	Update of Tx Timing Test cases	16.4.0
2020-06	RAN#88	RP-200987	0659		A	Update of FR2 RLM and BFD-LR Test cases	16.4.0
2020-06	RAN#88	RP-200987	0661		A	Update of FR2 SS-RSRP Test cases	16.4.0
2020-06	RAN#88	RP-200987	0663	1	A	CR on TCI state switch	16.4.0
2020-06	RAN#88	RP-200987	0665		A	CR on PDSCH RMC	16.4.0
2020-06	RAN#88	RP-201047	0668	1	B	CR on active spatial relation switch	16.4.0
2020-06	RAN#88	RP-200976	0671	1	B	CR to TS 38.133: CHO RRM requirement	16.4.0
2020-06	RAN#88	RP-201047	0672	1	B	CR to TS 38.133: RRM requirement for UE-specific CBW change delay	16.4.0
2020-06	RAN#88	RP-201047	0673		B	CR to TS 38.133: RRM requirement for interruption due to UE-specific CBW change	16.4.0
2020-06	RAN#88	RP-200969	0678	1	B	CR to TS 38.133: introducing 2-step RACH core requirements	16.4.0
2020-06	RAN#88	RP-200987	0680		A	Correction of CFRA RSRP threshold	16.4.0
2020-06	RAN#88	RP-200970	0682		B	CR for event triggered reporting tests for CLI	16.4.0
2020-06	RAN#88	RP-200958	0685		B	CR of NR V2X abbreviations	16.4.0
2020-06	RAN#88	RP-200958	0686	1	B	CR of interruption for switching between NR SL and LTE SL	16.4.0
2020-06	RAN#88	RP-200958	0687	2	F	CR of NR V2X editorial correction	16.4.0
2020-06	RAN#88	RP-200971	0689	1	B	38.133 CR on cell re-selection requirements for Rel-16 NR HST	16.4.0
2020-06	RAN#88	RP-201047	0690	1	B	CR on introducing inter-frequency measurements without measurement gap (9.1.5, 9.1.6, 9.3.1, 9.3.4, 9.3.5)	16.4.0
2020-06	RAN#88	RP-200987	0696		A	CR on SMTC period for beam management requirements	16.4.0
2020-06	RAN#88	RP-200987	0698		A	CR for CSI-RS based L1-RSRP measurement period	16.4.0
2020-06	RAN#88	RP-200987	0700		A	CR on RACH test cases with CSI-RS resource R16	16.4.0
2020-06	RAN#88	RP-200987	0704		A	CR on TS38.133 for modification of the layer 3 and layer 1 measurement sharing factor when both SSB and RSSI symbol to be measured are considered	16.4.0
2020-06	RAN#88	RP-200987	0706		A	CR on TS38.133 for modification on number of cells and number of SSB to be measured for FR2 intra-frequency measurement	16.4.0
2020-06	RAN#88	RP-200987	0708		A	[CR] TCI state switch delay 38.133 R16 Cat A	16.4.0
2020-06	RAN#88	RP-201047	0709	1	F	LTE CGI measurements with autonomous gaps for 38.133	16.4.0
2020-06	RAN#88	RP-201042	0710	3	B	Updates to general section for NR-U in 38.133	16.4.0
2020-06	RAN#88	RP-200976	0711	1	F	Correction to DAPS HO requirements in 38.133	16.4.0
2020-06	RAN#88	RP-201049	0712	2	F	SRVCC test case for event triggered reporting	16.4.0
2020-06	RAN#88	RP-201049	0713		F	Gap applicability errors corrected for SRVCC	16.4.0
2020-06	RAN#88	RP-200987	0715		A	Correction of NR SA FR2 inter-freq measurement reporting	16.4.0
2020-06	RAN#88	RP-200968	0717		F	NTA_offset setting for NR coexistence with NB-IoT	16.4.0
2020-06	RAN#88	RP-201042	0718	2	B	CR to TS 38.133: adding NR-U Handover.	16.4.0
2020-06	RAN#88	RP-200975	0723	1	B	CR on cell re-selection requirement for NR-EUTRAN measurement in TS38.133	16.4.0
2020-06	RAN#88	RP-201042	0725	1	B	CR: Introduction of L1-RSRP measurement requirements with CCA	16.4.0
2020-06	RAN#88	RP-200987	0727		A	CR: Correction of L1-RSRP measurement period	16.4.0
2020-06	RAN#88	RP-200987	0729		A	CR to TS 38.133: Correction to CSI-RS configurations in A.3.14 (Rel-16)	16.4.0
2020-06	RAN#88	RP-200987	0731		A	CR to TS 38.133: Correction to SMTC configuration in measurement accuracy tests (Rel-16)	16.4.0
2020-06	RAN#88	RP-200987	0733		A	CR to TS 38.133: Clarifications to AoA setup Annex A.5 (Rel-16)	16.4.0
2020-06	RAN#88	RP-200987	0735		A	CR to TS 38.133: Clarifications to AoA setup Annex A.7 (Rel-16)	16.4.0
2020-06	RAN#88	RP-201048	0736		F	CR for maximum MIMO layer adaptation	16.4.0
2020-06	RAN#88	RP-200987	0738	1	F	Applicability of QCL	16.4.0
2020-06	RAN#88	RP-201047	0741	1	B	CR to 38.133 on SRS carrier switching interruption requirements	16.4.0
2020-06	RAN#88	RP-201047	0742	1	B	CR to 38.133 on impact to measurement requirements due to LTE SRS carrier switching	16.4.0
2020-06	RAN#88	RP-200969	0743	1	B	CR to 38.133 on UE transmit timing requirements for 2-step RACH	16.4.0
2020-06	RAN#88	RP-200987	0744	1	F	CR to 38.133 on intra frequency measurements without gaps	16.4.0
2020-06	RAN#88	RP-200987	0748		A	CR on Psharingfactor_r16	16.4.0

2020-06	RAN#88	RP-200987	0750		A	CR on E-UTRAN Serving Cell Parameters_r16	16.4.0
2020-06	RAN#88	RP-200987	0752		A	CR on Modified parameters for BFD TCs with 4Rx antenna_r16	16.4.0
2020-06	RAN#88	RP-200987	0754		A	CR on BFD TCs_r16	16.4.0
2020-06	RAN#88	RP-200987	0756		A	CR on UL carrier RRC reconfiguration Delay TC_r16	16.4.0
2020-06	RAN#88	RP-200987	0758		A	CR to FR1 SCell activation delay test cases_r16	16.4.0
2020-06	RAN#88	RP-200987	0760		A	CR to inter-frequency measurement TCs_r16	16.4.0
2020-06	RAN#88	RP-200987	0762	1	F	CR to interruption TCs_r16	16.4.0
2020-06	RAN#88	RP-200987	0763	1	F	CR to FR1 SA inter-RAT measurement TCs_r16	16.4.0
2020-06	RAN#88	RP-201047	0764	1	B	CR on introduction of RRM requirements for BWP switching delay on multiple CCs	16.4.0
2020-06	RAN#88	RP-201042	0767	1	B	CR on introduction of Active TCI state switching delay with CCA Requirements for NR-U	16.4.0
2020-06	RAN#88	RP-201042	0768	2	B	CR on introduction of reporting criteria for NR-U	16.4.0
2020-06	RAN#88	RP-201042	0770	1	B	CR on introduction of RRC_INACTIVE state moblity requirements for NR-U	16.4.0
2020-06	RAN#88	RP-200987	0775		A	CR on interruption due to Acitve BWP switch (Cat A)	16.4.0
2020-06	RAN#88	RP-200987	0779		A	CR on UE transmit timing (Cat A)	16.4.0
2020-06	RAN#88	RP-200987	0781		A	Editoral CR on TS 38.133 Rel-16 (Cat A)	16.4.0
2020-06	RAN#88	RP-200987	0783		A	CR on RRC Connection Release with Redirection (Cat A)	16.4.0
2020-06	RAN#88	RP-200987	0785		A	CR on RRC Re-establishment test cases (Cat A)	16.4.0
2020-06	RAN#88	RP-200987	0787		A	CR on Timing advance test cases for EN-DC (Cat A)	16.4.0
2020-06	RAN#88	RP-200987	0789		A	CR on Timing test cases for NR SA (Cat A)	16.4.0
2020-06	RAN#88	RP-201045	0792	1	B	CR on DL interruption Tx switching between two uplink carriers	16.4.0
2020-06	RAN#88	RP-200975	0796	1	B	Cell identification in connected mode for NR-EUTRAN measurement in HST	16.4.0
2020-06	RAN#88	RP-200987	0799		A	Correction onTCI state switching R16	16.4.0
2020-06	RAN#88	RP-200987	0801		A	Accuracy of carrier aggregation in NR R16	16.4.0
2020-06	RAN#88	RP-201049	0802	1	B	Test case for NR to UTRA FDD Inter-RAT handover	16.4.0
2020-06	RAN#88	RP-200976	0804		F	CR on conditional PSCell change requirements	16.4.0
2020-06	RAN#88	RP-200973	0806	1	B	CR on SCell BFD and CBD requirements	16.4.0
2020-06	RAN#88	RP-201047	0808	1	B	CR on interruption requirements for FR2 inter-band CA	16.4.0
2020-06	RAN#88	RP-201047	0809		B	CR on scaling factor CSSFoutside_gap for FR2 inter-band CA	16.4.0
2020-06	RAN#88	RP-201047	0810	1	B	CR on scheduling availability requirements for FR2 inter-band CA	16.4.0
2020-06	RAN#88	RP-200987	0813		A	CR 38.133 (8.10.5) Corrections to RRC-based TCI state change	16.4.0
2020-06	RAN#88	RP-200966	0814		F	CR 38.133 (8.3.4-5) Corrections to Direct SCell activation	16.4.0
2020-06	RAN#88	RP-200987	0816		A	CR 38.133 (8.3.2) Corrections to SCell Activation delay requirements	16.4.0
2020-06	RAN#88	RP-200966	0817	1	F	CR 38.133 (8.3.4-5) Addition of interruption windows for Direct SCell Activation	16.4.0
2020-06	RAN#88	RP-200978	0818	1	B	CR to 38.133 for Introduction of band n259	16.4.0
2020-06	RAN#88	RP-201047	0819	1	B	CR on SCell activation requirements for FR2 inter-band CA	16.4.0
2020-06	RAN#88	RP-200987	0821		A	CR on FR2 measurement requirements outside gaps R16	16.4.0
2020-06	RAN#88	RP-200987	0823		A	CR on inter-RAT RSTD requirements for NE-DC in 38.133 R16	16.4.0
2020-06	RAN#88	RP-200987	0825		A	CR on SCell activation requirements R16	16.4.0
2020-06	RAN#88	RP-200987	0827		A	CR on SSB based L1-RSRP measurement R16	16.4.0
2020-06	RAN#88	RP-200987	0829		A	CR on L1-RSRP delay tests for FR2 R16	16.4.0
2020-06	RAN#88	RP-200987	0831		A	CR to L1-RSRP accuracy TC for FR2 EN-DC R16	16.4.0
2020-06	RAN#88	RP-200987	0833		A	CR to L1-RSRP accuracy TC for FR2 SA R16	16.4.0
2020-06	RAN#88	RP-200987	0835		A	CR to TCI state switch TC R16	16.4.0
2020-06	RAN#88	RP-200970	0836		F	CR on CLI measurement requirements	16.4.0
2020-06	RAN#88	RP-200970	0837	1	F	CR on CLI measurement performance requirements	16.4.0
2020-06	RAN#88	RP-200970	0838		B	CR on test cases for SRS-RSRP measurement accuracy in FR1	16.4.0
2020-06	RAN#88	RP-200970	0839	1	B	CR on test cases for SRS-RSRP measurement accuracy in FR2	16.4.0
2020-06	RAN#88	RP-200970	0840		B	CR on test cases for CLI-RSSI measurement accuracy in FR1	16.4.0
2020-06	RAN#88	RP-200970	0841	1	B	CR on test cases for CLI-RSSI measurement accuracy in FR2	16.4.0
2020-06	RAN#88	RP-200966	0843		B	CR on interruption requirements for direct SCell activation for 38.133	16.4.0
2020-06	RAN#88	RP-200966	0844	1	B	CR on delay requirements for SCell dormancy	16.4.0
2020-06	RAN#88	RP-200966	0845	1	B	CR on interruption requirements for SCell dormancy	16.4.0
2020-06	RAN#88	RP-201044	0847	1	B	CR for gNB Rx-Tx time difference and UL-RTOA report mapping	16.4.0
2020-06	RAN#88	RP-201044	0849	1	B	CR for AoA/ZoA report mapping	16.4.0
2020-06	RAN#88	RP-201048	0854	2	B	Measurement requirements for UEs under power saving mode	16.4.0
2020-06	RAN#88	RP-201044	0857	1	B	NR E-CID reporting criteria requirements	16.4.0
2020-06	RAN#88	RP-201044	0858	1	B	NR E-CID measurement requirements	16.4.0
2020-06	RAN#88	RP-201044	0862	1	B	Positioning measurement accuracy requirements structure in section 10	16.4.0
2020-06	RAN#88	RP-201044	0863	2	B	Reporting criteria for NR RSTD	16.4.0
2020-06	RAN#88	RP-200987	0867		A	Clarification on RLM	16.4.0
2020-06	RAN#88	RP-201042	0869		B	BWP switching interruption requirement due to consistent UL failure in 38.133	16.4.0
2020-06	RAN#88	RP-200969	0871	1	B	Applicability of 2-step RA and 4-step RA in RRM requirements in 38.133	16.4.0
2020-06	RAN#88	RP-200975	0874	1	B	CR to TS 38.133: NR HST beam management requirements	16.4.0
2020-06	RAN#88	RP-201047	0875	1	B	CR on 38133 interruption requirements for BWP switching on	16.4.0

						multiple CCs	
2020-06	RAN#88	RP-200966	0879	1	B	Big CR Introduction of UE requirement for MR-DC early measurement reporting in 38.133	16.4.0
2020-06	RAN#88	RP-201042	0885		B	RRC release with redirection requirements in NR-U in 38.133	16.4.0
2020-06	RAN#88	RP-200988	0886	1	A	Rapportuer CR for TS38.133	16.4.0
2020-06	RAN#88	RP-201047	0887		B	CR: mandatory gap pattern	16.4.0
2020-09	RAN#88	RP-201512	0889		A	CR to Redirection from NR in FR1 to E-UTRAN	16.5.0
2020-09	RAN#88	RP-201512	0891		A	CR to timing advance adjustment accuracy in FR1	16.5.0
2020-09	RAN#88	RP-201512	0895		A	CR to SS-RSRQ Intra-Frequency and Inter-frequency FR1 measurement accuracy	16.5.0
2020-09	RAN#88	RP-201512	0897		A	Update to FR2 240kHz SSB Configurations	16.5.0
2020-09	RAN#88	RP-201512	0899		A	Update of FR2 Random Access Test cases	16.5.0
2020-09	RAN#88	RP-201512	0901		A	Update to FR2 event-triggered reporting RRM Test cases in A.5.6 and A.7.6	16.5.0
2020-09	RAN#88	RP-201512	0903		A	Update to FR2 SS-RSRP RRM Test cases in A.5.7 and A.7.7	16.5.0
2020-09	RAN#88	RP-201512	0905		A	CR to EN-DC timing advance adjustment accuracy in FR2	16.5.0
2020-09	RAN#88	RP-201512	0907		A	CR to configuration of CSI-RS for tracking	16.5.0
2020-09	RAN#88	RP-201512	0909		A	Update of RRC-based Active BWP Switch test cases	16.5.0
2020-09	RAN#88	RP-201512	0911		A	Update to FR2 Annex B RRM side conditions	16.5.0
2020-09	RAN#88	RP-201512	0913		A	Add UE Beam assumption for RRM Test cases in A.5.5	16.5.0
2020-09	RAN#88	RP-201496	0914	1	B	Introduction of the P-MPR 2 bits report mapping in 38.133	16.5.0
2020-09	RAN#88	RP-201512	0922		A	Add UE Beam assumption for RRM Test cases in A.7.5 Rel-16	16.5.0
2020-09	RAN#88	RP-201489	0924	1	F	Maintenance CR for 2-step RA	16.5.0
2020-09	RAN#88	RP-201491	0925	2	B	CR to TS 38.133: PRS RSTD requirements	16.5.0
2020-09	RAN#88	RP-201498	0928	1	F	CR on capabilities for support of event triggering and reporting criteria	16.5.0
2020-09	RAN#88	RP-201512	0931		F	CR for TS38.133 Rel-16, Corrction for SCell activation delay requirement	16.5.0
2020-09	RAN#88	RP-201512	0933		A	CR for TS38.133 Rel-16, Correction for RRM core requirements	16.5.0
2020-09	RAN#88	RP-201512	0935		A	CR for TS38.133 Rel-16, Correction for test cases of BWP switching	16.5.0
2020-09	RAN#88	RP-201498	0937	1	B	CR on CSI-RS based intra-frequency measurement requirement (Introduction, requirement applicability and number of cell and beams)	16.5.0
2020-09	RAN#88	RP-201500	0939	1	B	CR on uplink spatial relation switch delay (section 8.12)	16.5.0
2020-09	RAN#88	RP-201506	0940	1	B	Introduction of SCell activation/deactivation delay requirements for SCells operating with CCA	16.5.0
2020-09	RAN#88	RP-201491	0941	2	B	Revision of CSSF within gap to include NR positioning measurements with gap sharing	16.5.0
2020-09	RAN#88	RP-201491	0942	3	B	Introduction of new MG patterns for NR positioning	16.5.0
2020-09	RAN#88	RP-201491	0943	2	B	Introduction of UE Rx-Tx time difference measurement requirements for NR positioning	16.5.0
2020-09	RAN#88	RP-201512	0946		A	CR on TS38.133 for handover test cases	16.5.0
2020-09	RAN#88	RP-201512	0948		A	CR on TS38.133 for introducing the PDSCH RMC configuration in cell re-selection test cases	16.5.0
2020-09	RAN#88	RP-201493	0950	2	F	CR on TS38.133 for dual active protocol stack handover (Section 6.1.3)	16.5.0
2020-09	RAN#88	RP-201507	0952		F	CR on TS38.133 for intra-frequency measurement definition (Section 9.2.1)	16.5.0
2020-09	RAN#88	RP-201512	0956		A	CR on FR2 measurement capability for R16	16.5.0
2020-09	RAN#88	RP-201506	0957		B	CR on UE measurement capability of NR-U for R16	16.5.0
2020-09	RAN#88	RP-201507	0958	1	B	CR on RRM requirement based on dual DRX for FR1+FR2 CA	16.5.0
2020-09	RAN#88	RP-201506	0959		F	Update NR Frequency Band Groups to include Band n30	16.5.0
2020-09	RAN#88	RP-201506	0960		F	Update NR Frequency Band Groups to include Band n14	16.5.0
2020-09	RAN#88	RP-201506	0961		F	CR for Table number mismatch for CLI performance tests	16.5.0
2020-09	RAN#88	RP-201512	0963		A	CR on Inter-RAT RSTD measurements (section 9.4.4)	16.5.0
2020-09	RAN#88	RP-201512	0965		A	CR on active BWP switch in R16	16.5.0
2020-09	RAN#88	RP-201500	0968	1	F	CR on multiple SCells activation (section 8.3.7)	16.5.0
2020-09	RAN#88	RP-201496	0969	1	F	CR on MRTD and MTTD for FR2 inter-band CA	16.5.0
2020-09	RAN#88	RP-201498	0970	1	B	CR on MRTD for FR2 inter-band CA	16.5.0
2020-09	RAN#88	RP-201498	0971	1	B	38.133 CR on UE measurement capability on the number of frequency layers to be monitored for CSI-RS measurement	16.5.0
2020-09	RAN#88	RP-201497	0972		F	38.133 CR on cell re-selection requirements for Rel-16 NR HST	16.5.0
2020-09	RAN#88	RP-201492	0973	1	F	CR of missed requirements based on the agreed CRs in RAN4#95-e	16.5.0
2020-09	RAN#88	RP-201492	0974	1	F	CR of interruption requirements	16.5.0
2020-09	RAN#88	RP-201500	0976	1	F	CR on definition of inter-frequency measurements without measurement gap (9.3.1)	16.5.0
2020-09	RAN#88	RP-201500	0984		F	CR on BWP switch on multiple CCs	16.5.0
2020-09	RAN#88	RP-201512	0986		A	CR for SCell activation delay in FR2 in R16	16.5.0
2020-09	RAN#88	RP-201512	0988		A	CR on TCI state switch delay in R16	16.5.0
2020-09	RAN#88	RP-201506	0991	1	B	CR for timing requirement for NR-U	16.5.0
2020-09	RAN#88	RP-201488	0992	1	B	CR for introduction of pathloss reference signal switching delay	16.5.0
2020-09	RAN#88	RP-201488	0993	1	F	CR for L1-SINR requirement	16.5.0

2020-09	RAN#88	RP-201498	0996	2	B	CR on introduction, applicability and capability for CSI-RS inter-frequency measurement requirements	16.5.0
2020-09	RAN#88	RP-201500	0999	1	B	Impact of CGI reading on L1 and L3 measurement	16.5.0
2020-09	RAN#88	RP-201498	1003	1	B	38.133 CR on introduction of CSI-RS based measurement	16.5.0
2020-09	RAN#88	RP-201488	1006		F	Correction of L1-SINR reporting requirements	16.5.0
2020-09	RAN#88	RP-201506	1007	2	B	CR: Beam management requirements with CCA	16.5.0
2020-09	RAN#88	RP-201507	1008		F	[CR] Corrections to DAPS Handover	16.5.0
2020-09	RAN#88	RP-201500	1010	2	F	CR for FR2 inter-band CA requirements	16.5.0
2020-09	RAN#88	RP-201506	1011	1	D	CR to TS 38.133 - Handover requirements in NR-U	16.5.0
2020-09	RAN#88	RP-201506	1012	2	B	CR to TS 38.133 to address NR-U inter-frequency measurements	16.5.0
2020-09	RAN#88	RP-201512	1015	1	F	CR 38.133 (8.3.2-3) Corrections to SCell activation delay requirements	16.5.0
2020-09	RAN#88	RP-201494	1016	1	B	CR 38.133 (8.3.9-8.3.11) Direct SCell activation delay for multiple downlink SCells	16.5.0
2020-09	RAN#88	RP-201494	1017	2	F	CR 38.133 SCell dormancy switching of multiple SCells	16.5.0
2020-09	RAN#88	RP-201494	1018		B	CR on delay requirements for SCell dormancy	16.5.0
2020-09	RAN#88	RP-201498	1020	1	B	CR on inter-frequency CSI-RS L3 measurement requirements	16.5.0
2020-09	RAN#88	RP-201512	1023		A	Clarification of SNR values in RLM Test cases	16.5.0
2020-09	RAN#88	RP-201512	1025		A	CR to TS 38.133: Corrections to CSI-RS configurations in A.3.14 (Rel-16)	16.5.0
2020-09	RAN#88	RP-201512	1027		A	CR to TS 38.133: Corrections to event triggered test cases (Rel-16)	16.5.0
2020-09	RAN#88	RP-201512	1029		A	CR to TS 38.133: Corrections to inter-RAT test cases (Rel-16)	16.5.0
2020-09	RAN#88	RP-201512	1031		A	CR to TS 38.133: Corrections to AoA setup information in some test cases (Rel-16)	16.5.0
2020-09	RAN#88	RP-201512	1033		A	CR on maintaining handover tests in Rel-16	16.5.0
2020-09	RAN#88	RP-201500	1039	1	F	CR on maintaining measurement restriction requirements for NR CA	16.5.0
2020-09	RAN#88	RP-201500	1041	3	F	CR on BWP switching delay on mulitple CCs	16.5.0
2020-09	RAN#88	RP-201506	1042	2	F	CR on active TCI state switching for NR-U	16.5.0
2020-09	RAN#88	RP-201506	1043	2	B	CR on introduction of intra-frequency measurements requirements for NR-U	16.5.0
2020-09	RAN#88	RP-201506	1044	1	B	CR on introduction of Active BWP switching delay requirements for NR-U	16.5.0
2020-09	RAN#88	RP-201506	1045	1	B	CR on introduction of RRC_IDLE state moblity requirements for NR-U	16.5.0
2020-09	RAN#88	RP-201506	1046	1	B	Discussion on RRC re-establishment for NR-U	16.5.0
2020-09	RAN#88	RP-201512	1048		A	CR on reporting criteria for EN-DC in 38.133 R15	16.5.0
2020-09	RAN#88	RP-201512	1050		A	CR on test cases for Active TCI state switch delay R15	16.5.0
2020-09	RAN#88	RP-201512	1052		A	Addition of new default configurations for RMC scheduling_r16	16.5.0
2020-09	RAN#88	RP-201512	1054		A	Correction to beam failure detection and link recovery test cases_r16	16.5.0
2020-09	RAN#88	RP-201512	1056		A	Correction to BWP switching delay test cases_r16	16.5.0
2020-09	RAN#88	RP-201512	1058		A	Correction to FR1 intra-frequency measurement with gap test cases_r16	16.5.0
2020-09	RAN#88	RP-201512	1060		A	Correction to inter-RAT HO test cases_r16	16.5.0
2020-09	RAN#88	RP-201498	1064	2	B	CR on CSI-RS based intra-frequency measurement requirements	16.5.0
2020-09	RAN#88	RP-201500	1066	1	F	Correction on the interruption requirements due to SRS carrier switching	16.5.0
2020-09	RAN#88	RP-201500	1067	1	F	CSSF for inter-frequency measurement without gap in FR2 inter-band CA sceneario	16.5.0
2020-09	RAN#88	RP-201512	1070		A	CR on correction to CSSF within gap R16	16.5.0
2020-09	RAN#88	RP-201512	1072		A	CR on SCell activation requirements R16	16.5.0
2020-09	RAN#88	RP-201512	1075		A	CR on UL BWP configuration for RRM test cases R16	16.5.0
2020-09	RAN#88	RP-201512	1077		A	CR to add UE beam assumption for TC in A.5.6 R16	16.5.0
2020-09	RAN#88	RP-201506	1078		F	CR on reporting criteria for CLI	16.5.0
2020-09	RAN#88	RP-201494	1080	1	B	CR on direct SCell activation	16.5.0
2020-09	RAN#88	RP-201494	1081	2	F	CR on requirements for SCell dormancy	16.5.0
2020-09	RAN#88	RP-201491	1082	1	B	CR for general applicability of PRS measurement requirements	16.5.0
2020-09	RAN#88	RP-201491	1083	2	B	CR for measurement requirements for PRS-RSRP	16.5.0
2020-09	RAN#88	RP-201491	1085	2	B	CR to add CSI-RS related reporting criteria for ECID	16.5.0
2020-09	RAN#88	RP-201490	1088	2	F	Correction CR to Rel-16 UE power saving requirements	16.5.0
2020-09	RAN#88	RP-201506	1090		F	Correction to RACH delay in RRC release requirements in NR-U in 38.133	16.5.0
2020-09	RAN#88	RP-201512	1097		A	CR to 38.133 correction to RRC based BWP switch delay requirements	16.5.0
2020-09	RAN#88	RP-201512	1099		A	CR to 38.133 correction to interruption requirements for per-FR gap in FR2	16.5.0
2020-09	RAN#88	RP-201500	1100		B	CR to 38.133 on CGI reading of NR cell	16.5.0
2020-09	RAN#88	RP-201497	1101		F	CR to TS 38.133: Corrections to Table 9.4.3.3-2 in subclause 9.4.3.3 (Requirements when DRX is used)	16.5.0
2020-09	RAN#88	RP-201506	1102	2	B	Introduction of RLM requirements for NR-U	16.5.0
2020-09	RAN#88	RP-201491	1103	2	B	Measurement report mapping and additional path reporting for UE Rx-Tx	16.5.0

2020-09	RAN#88	RP-201491	1104	2	B	Measurement report mapping and additional path reporting for RSTD	16.5.0
2020-09	RAN#88	RP-201491	1106	1	F	Reporting criteria for NR positioning measurements	16.5.0
2020-09	RAN#88	RP-201491	1107		F	General introduction of NR positioning measurements	16.5.0
2020-09	RAN#88	RP-201498	1108	1	B	CR on scheduling restriction for CSI-RS based intra-frequency measurement	16.5.0
2020-09	RAN#88	RP-201507	1111		F	[CR] Replacing x in references with correct numbers (Core R16 Cat F)	16.5.0
2020-09	RAN#88	RP-201512	1113		A	[CR] Replacing x in references with correct numbers (Core R16 Cat A)	16.5.0
2020-09	RAN#88	RP-201512	1114		A	[CR] Replacing x in references with correct numbers (Perf R16 Cat A)	16.5.0
2020-09	RAN#88	RP-201512	1116		A	Fine/rough beam assumption for idle mode and measurement procedure test case	16.5.0
2020-09	RAN#88	RP-201512	1117		A	CR on BWP switching delay requirements R16	16.5.0
2020-12	RAN#90	RP-202433	1108	4	B	CR on scheduling restriction for CSI-RS based intra-frequency measurement	17.0.0
2020-12	RAN#90	RP-202487	1119		A	RB allocation and Noc level in RLM Test cases	17.0.0
2020-12	RAN#90	RP-202487	1121		A	Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6	17.0.0
2020-12	RAN#90	RP-202487	1123		A	240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases	17.0.0
2020-12	RAN#90	RP-202487	1125		A	Correct UE beam assumption for Test Cases in A.5.6	17.0.0
2020-12	RAN#90	RP-202487	1127		A	Aggregation level of CORESET for RMC scheduling	17.0.0
2020-12	RAN#90	RP-202487	1129		A	Claify FR1 NSA SS-SINR measurement TCs	17.0.0
2020-12	RAN#90	RP-202487	1131		A	FR1 Inter-frequency Event triggered Reporting tests in DRX	17.0.0
2020-12	RAN#90	RP-202487	1133		A	E-UTRAN	17.0.0
2020-12	RAN#90	RP-202419	1138		F	CR for DAPS HO test applicability	17.0.0
2020-12	RAN#90	RP-202487	1139		F	Maintenance CR on SA inter-frequency event triggered reporting tests for FR1	17.0.0
2020-12	RAN#90	RP-202433	1140	1	F	CR on CSSF with both CSI-RS and SSB	17.0.0
2020-12	RAN#90	RP-202444	1146		A	CR on CSI-RS BW condition for BFD/CBD R16	17.0.0
2020-12	RAN#90	RP-202444	1148		A	CR on AP-CSI-RS based L1-RSRP measurement R16	17.0.0
2020-12	RAN#90	RP-202427	1152	1	F	CR of NR V2X operating band group	17.0.0
2020-12	RAN#90	RP-202436	1155	1	F	CR on TS38.133 for dual active protocol stack handover	17.0.0
2020-12	RAN#90	RP-202430	1156	2	F	CR on TS38.133 interruption time for CA with non-aligned frame boundaries	17.0.0
2020-12	RAN#90	RP-202444	1158		F	CR on TS38.133 for inter-frequency measurement requirement without gap	17.0.0
2020-12	RAN#90	RP-202487	1160		A	CR on TS38.133 for cell activation and deactivation test case	17.0.0
2020-12	RAN#90	RP-202487	1162		A	CR on TS38.133 for cell reselection test case	17.0.0
2020-12	RAN#90	RP-202487	1164		A	CR on TS38.133 for active BWP switch test cases	17.0.0
2020-12	RAN#90	RP-202487	1165		F	CR on TS38.133 for E-UTRAN	17.0.0
2020-12	RAN#90	RP-202509	1166		F	CR on TS38.133 for SCell activation and deactivation delay test cases	17.0.0
2020-12	RAN#90	RP-202487	1168		A	CR for TS38.133 Rel-16, Correction for RRM core and test cases	17.0.0
2020-12	RAN#90	RP-202433	1171	1	F	CR on abbreviations about CSI-RS based measurement in 38.133.	17.0.0
2020-12	RAN#90	RP-202442	1184		F	CR to TS 38.133: Add information on the inter-band EN-DC and UL CA configurations with no DL interruption	17.0.0
2020-12	RAN#90	RP-202433	1186	1	F	CR on R16 CSI-RS based L3 measurements	17.0.0
2020-12	RAN#90	RP-202419	1187	2	B	Intra-band Inter-frequency sync DAPS handover test in SA for FR1	17.0.0
2020-12	RAN#90	RP-202427	1191	1	F	CR: Interruption requirement for NR V2X synchronization source chang	17.0.0
2020-12	RAN#90	RP-202432	1193		F	Fine/rough beam assumption for CLI performance test cases	17.0.0
2020-12	RAN#90	RP-202435	1194	1	F	38.133 CR on CSSFintra for measurement period for intra-frequency measurements in connected mode for Rel-16 NR HST	17.0.0
2020-12	RAN#90	RP-202486	1196		A	CR on carrier frequency range of PCell/PSCell for the maximum number of RLM-RS resources	17.0.0
2020-12	RAN#90	RP-202487	1209		A	Correction on beamFailureInstanceMaxCount for test cases of availability restriction during FR2 BFR in R16	17.0.0
2020-12	RAN#90	RP-202444	1212	1	F	Correction on unknown SCell activation in FR2.	17.0.0
2020-12	RAN#90	RP-202415	1213	1	B	Big CR on 2-step RA type RRM performance requirements	17.0.0
2020-12	RAN#90	RP-202431	1214	1	F	CR Maintenance 2-step RACH RRM requirements	17.0.0
2020-12	RAN#90	RP-202487	1216		A	Correction of RRM tests	17.0.0
2020-12	RAN#90	RP-202435	1217	1	F	CR on IDLE state cell re-selection requirements for HST in 38.133	17.0.0
2020-12	RAN#90	RP-202487	1225		A	Correction to types of requirements in annex A	17.0.0
2020-12	RAN#90	RP-202487	1227		A	Corrections to frequency range in interfrequency measurement procedures tests	17.0.0
2020-12	RAN#90	RP-202487	1230		A	Correction on TBD values in FR1+FR2 interfrequency RSRP accuracy tests	17.0.0
2020-12	RAN#90	RP-202486	1232		A	Addition of symbol definitions	17.0.0
2020-12	RAN#90	RP-202487	1236		A	Square bracket removal in 38.133 section A.1 to A.5	17.0.0
2020-12	RAN#90	RP-202487	1238		A	Square bracket removal in 38.133 section A.6 to A.8	17.0.0
2020-12	RAN#90	RP-202419	1240	1	B	Conditional handover test cases for NR	17.0.0
2020-12	RAN#90	RP-202414	1241		B	Updates to general section for NR-U in 38.133	17.0.0
2020-12	RAN#90	RP-202486	1250		A	CR on MO merge	17.0.0

2020-12	RAN#90	RP-202444	1252	1	F	CR to TS 38.133 on DCI based BWP switch requirements for cross carrier scheduling	17.0.0
2020-12	RAN#90	RP-202441	1254	1	B	CR on PRS-RSRP report mapping	17.0.0
2020-12	RAN#90	RP-202487	1259		A	Correction to CSI-RS RMC configuration R16	17.0.0
2020-12	RAN#90	RP-202487	1261		A	Correction to cell reselection test cases R16	17.0.0
2020-12	RAN#90	RP-202487	1263		A	Correction to inter-RAT handover test cases R16	17.0.0
2020-12	RAN#90	RP-202487	1265		A	Correction to NR measurement under LTE SA test cases R16	17.0.0
2020-12	RAN#90	RP-202487	1267		A	Correction to inter-RAT SFTD measurement test cases R16	17.0.0
2020-12	RAN#90	RP-202487	1271		A	CR on maintaining BFD/CBD measurements test cases in TS38.133 R16	17.0.0
2020-12	RAN#90	RP-202487	1273		F	CR on maintaining L1-RSRP measurements test cases R16	17.0.0
2020-12	RAN#90	RP-202446	1275	1	F	Correction CR to Rel-16 UE power saving requirements	17.0.0
2020-12	RAN#90	RP-202442	1276		F	Correction on DL interruption on Tx Switching between two uplink carriers	17.0.0
2020-12	RAN#90	RP-202433	1277	1	F	CR on CSI-RS based intra-frequency measurement requirements	17.0.0
2020-12	RAN#90	RP-202444	1281		F	Correction on RRC based spatial relation switch delay	17.0.0
2020-12	RAN#90	RP-202487	1282		F	Correction on SA inter-RAT measurement FR1 test case	17.0.0
2020-12	RAN#90	RP-202444	1283	1	F	CR on BWP switching delay on mulitple CCs	17.0.0
2020-12	RAN#90	RP-202444	1284	1	F	CR on interruption due to active BWP switching on mulitple CCs	17.0.0
2020-12	RAN#90	RP-202414	1288	1	F	CR on TCI state switching requirements for NR-U	17.0.0
2020-12	RAN#90	RP-202414	1291		F	CR on intra-frequency measurement requirements for NR-U	17.0.0
2020-12	RAN#90	RP-202486	1296		A	CR on RRC-based BWP switch requirements_R16	17.0.0
2020-12	RAN#90	RP-202487	1298		A	CR on RRC-based active TCI state switch test case Rel-16	17.0.0
2020-12	RAN#90	RP-202425	1299		F	Update NR Frequency Band Groups to include Band n48	17.0.0
2020-12	RAN#90	RP-202439	1300		F	Update NR Frequency Band Groups to include Band n65	17.0.0
2020-12	RAN#90	RP-202446	1305		F	CR to 38.133: Correction to relaxed measurement requirements	17.0.0
2020-12	RAN#90	RP-202444	1306	1	F	CR to 38.133: Correction to relaxed measurement requirements	17.0.0
2020-12	RAN#90	RP-202444	1307	1	F	CR to 38.133: Correction to SRS carrier based switching requirements	17.0.0
2020-12	RAN#90	RP-202444	1308	1	F	CR to 38.133: Correction to mandatory gap pattern	17.0.0
2020-12	RAN#90	RP-202509	1309		F	[CR] NR Perf Maintenance R16 Cat F	17.0.0
2020-12	RAN#90	RP-202486	1311		A	[CR] Specify RRC processing delay in TCI state switching delay (Cat A)	17.0.0
2020-12	RAN#90	RP-202486	1317		A	CR on SCell activation requirements R16	17.0.0
2020-12	RAN#90	RP-202487	1319		A	CR on FR2 unkown SCell activation test cases R16	17.0.0
2020-12	RAN#90	RP-202487	1321		A	CR on BWP in L1-RSRP delay and accuracy test cases R16	17.0.0
2020-12	RAN#90	RP-202430	1322	1	F	CR on BWP switching and SCell dormancy	17.0.0
2020-12	RAN#90	RP-202441	1324	1	F	CR to update PRS-RSRP measurement requirements	17.0.0
2020-12	RAN#90	RP-202444	1328	1	F	CR on CGI reading requirements 38.133	17.0.0
2020-12	RAN#90	RP-202509	1330		F	[CR] Specify RRC processing delay in TCI state switching delay for R16 NR-U	17.0.0
2020-12	RAN#90	RP-202442	1331		F	Correction of CR0972 implementation	17.0.0
2020-12	RAN#90	RP-202487	1333		F	CR: Correction of CFRA test in FR2 SA	17.0.0
2020-12	RAN#90	RP-202434	1334	1	F	CR: Clarification of L1-SINR reporting with CSI-RS based CMR and dedicated IMR configured	17.0.0
2020-12	RAN#90	RP-202486	1336		A	Introducing reference to the source of the Lmax and NRLM.	17.0.0
2020-12	RAN#90	RP-202430	1338	2	F	CR on UE requirement for MR-DC early measurement reporting in 38.133	17.0.0
2020-12	RAN#90	RP-202444	1340		F	CR on measurement restrictions for FR2 inter-band CA	17.0.0
2020-12	RAN#90	RP-202487	1342		A	CR to TS 38.133: Corrections to inter-RAT FR1 test cases (Rel-16)	17.0.0
2020-12	RAN#90	RP-202487	1344		A	CR to TS 38.133: Corrections to inter-RAT FR2 test cases (Rel-16)	17.0.0
2020-12	RAN#90	RP-202436	1346		F	CR 38.133 Corrections to Conditional PSCell Change delay requirement	17.0.0
2020-12	RAN#90	RP-202444	1347		F	CR 38.133 Removal of brackets for Multiple SCell activation	17.0.0
2020-12	RAN#90	RP-202430	1348	1	F	CR 38.133 Removal of brackets for SCell Dormancy and Direct SCell Activation	17.0.0
2020-12	RAN#90	RP-202487	1350		A	CR 38.133 Correction to test case for TCI state switching (Rel-16)	17.0.0
2020-12	RAN#90	RP-202418	1358	1	F	gNB timing positioning measurement report mapping update for k	17.0.0
2020-12	RAN#90	RP-202446	1360	1	F	Corrections to UE power saving requirements	17.0.0
2020-12	RAN#90	RP-202487	1364		A	Removal of annex B.2.6 on one shot timing adjustment in 38.133	17.0.0
2020-12	RAN#90	RP-202487	1366		F	Correction to NR FR1 DL active BWP switch of Cell with non-DRX in SA (A.6.5.6.2.1)	17.0.0
2020-12	RAN#90	RP-202444	1367	1	F	Correction to RRC based non-simultaneous multiple CC BWP	17.0.0
2020-12	RAN#90	RP-202414	1369		F	Requirements for known cell in RRC re-establishment with CCA	17.0.0
2020-12	RAN#90	RP-202435	1370		F	CR to TS 38.133: Corrections to Tables 9.5.4.1-1 and 9.5.4.2-1.	17.0.0
2020-12	RAN#90	RP-202486	1372	1	A	CR to 38.133 on Active BWP switch and Active TCI State Switching requirements - Rel16	17.0.0
2020-12	RAN#90	RP-202441	1375	2	F	UE positioning measurements: RSTD	17.0.0
2020-12	RAN#90	RP-202414	1384	1	F	Terminology updates for NR-U	17.0.0
2020-12	RAN#90	RP-202414	1387		F	Clause numbering correction	17.0.0
2020-12	RAN#90	RP-202414	1390	1	F	Measurement requirements for NR-U	17.0.0
2020-12	RAN#90	RP-202444	1391		F	Correction in NR SRS carrier-based switching requirements	17.0.0
2020-12	RAN#90	RP-202419	1393	1	B	Introduction of intra-frequency sync and async DAPS HO test cases in FR1	17.0.0

2020-12	RAN#90	RP-202430	1400	1	F	CR to Multi-SCell activation for FR1 intra-band contiguous CA	17.0.0
2020-12	RAN#90	RP-202430	1401		F	CR to Staring point of an Interruption window at Direct SCell activation	17.0.0
2020-12	RAN#90	RP-202414	1403	1	F	Interruption windows and applicability of Scell activation/deactivation requirements for SCells operating with CCA	17.0.0
2020-12	RAN#90	RP-202419	1406		B	CR on inter-band DAPS handover tests	17.0.0
2020-12	RAN#90	RP-202414	1407		F	Correction to timing requirements in NR-U	17.0.0
2020-12	RAN#90	RP-202417	1409		B	Big CR: Introduction of Rel-16 NR UE Power Saving RRM Performance requirements (TS 38.133)	17.0.0
2020-12	RAN#90	RP-202421	1410		B	Big CR: Introduction of Rel-16 NR FR1 RF WI RRM performance requirements	17.0.0
2020-12	RAN#90	RP-202422	1411		B	Big CR: NR HST RRM performance requirements	17.0.0
2020-12	RAN#90	RP-202487	1413		A	[CR] NR Perf Maintenance R16 Cat A	17.0.0
2021-03	RAN#91	RP-210116	1418		A	[CR] RRM test case maintenance R17 Cat A	17.1.0
2021-03	RAN#91	RP-210116	1424		A	Update FR2 Reference channels and OCNG for FR2 RRM Test cases	17.1.0
2021-03	RAN#91	RP-210116	1427		A	CR to FR1 SA SS-SINR measurement TCs	17.1.0
2021-03	RAN#91	RP-210116	1430		A	CR on E-UTRA carrier for EN-DC event triggered reporting tests	17.1.0
2021-03	RAN#91	RP-210116	1433		A	Add missing FR2 Test case setups and Beam assumptions	17.1.0
2021-03	RAN#91	RP-210091	1437		A	[CR] Core maintenance for 38.133 (Cat A)	17.1.0
2021-03	RAN#91	RP-210071	1446		A	CR on maintenance for inter-band FR2 CA RRM R17	17.1.0
2021-03	RAN#91	RP-210071	1448		A	CR on UE behavior for UE specific CBW change R17	17.1.0
2021-03	RAN#91	RP-210091	1450		A	CR on IDLE/INACTIVE RRM requirement with SMTC2-LP R17	17.1.0
2021-03	RAN#91	RP-210070	1456		A	CR to 38.133 on Link Recovery requirements (R17)	17.1.0
2021-03	RAN#91	RP-210070	1458		A	CR to 38.133 on Pathloss activation delay requirements (R17)	17.1.0
2021-03	RAN#91	RP-210097	1469		B	CR for TS 38.133 introduction of NR band n24	17.1.0
2021-03	RAN#91	RP-210076	1482		A	CR on CSI-RS based L3 measurement	17.1.0
2021-03	RAN#91	RP-210081	1489		A	CR on PRS RSTD measurement requirements	17.1.0
2021-03	RAN#91	RP-210116	1496		A	Correction to cell reselection test case	17.1.0
2021-03	RAN#91	RP-210066	1498		A	Correction to cell reselection test case for UE Power saving	17.1.0
2021-03	RAN#91	RP-210073	1502		A	2-step RACH RRM performance requirements corrections	17.1.0
2021-03	RAN#91	RP-210116	1505		F	Update of DRX configuration in FR1 Event-triggered Test cases	17.1.0
2021-03	RAN#91	RP-210072	1507		A	Big CR-Introduction of NR V2X RRM performance requirements (Rel-17)	17.1.0
2021-03	RAN#91	RP-210070	1511		A	Correction on the measurement restriction for CSI-IM resource in R17	17.1.0
2021-03	RAN#91	RP-210116	1514		A	Correction on PRACH configuration for FR2 Non-Contention based Random Access in R17	17.1.0
2021-03	RAN#91	RP-210116	1517		A	Correction on PRACH configuration for Beam Failure Detection and Link Recovery Test in R17	17.1.0
2021-03	RAN#91	RP-210116	1520		A	Correction on PRACH RMC for FR1 CSI-RS based Non-Contention based Random Access for BFR in R17	17.1.0
2021-03	RAN#91	RP-210071	1522		A	Correction on scheduling availability and measurement restriction on FR2 inter-band CA in R17	17.1.0
2021-03	RAN#91	RP-210077	1527		A	CR on HST RRM requirements in connected mode	17.1.0
2021-03	RAN#91	RP-210070	1534		A	CR to TS38.133 on L1-SINR measurement requirement	17.1.0
2021-03	RAN#91	RP-210064	1536		A	Big CR: Introduction of Rel-16 NR eMIMO RRM performance requirements and test cases	17.1.0
2021-03	RAN#91	RP-210117	1539		A	CR on Scell activation delay maintenance (R17)	17.1.0
2021-03	RAN#91	RP-210091	1542		A	Interruption requirements maintenance in NR-DC (R17)	17.1.0
2021-03	RAN#91	RP-210077	1544		A	CR on HST core part maintenance (R17)	17.1.0
2021-03	RAN#91	RP-210116	1547		A	CR for test requirements correction of SA event triggered reporting tests for FR1 inter-frequency measurements with SSB time index detection when DRX is used	17.1.0
2021-03	RAN#91	RP-210117	1550		A	CR on R15 remaining issues	17.1.0
2021-03	RAN#91	RP-210072	1552		A	CR on V2X interruption	17.1.0
2021-03	RAN#91	RP-210091	1556		A	CR for measurement period requirements correction	17.1.0
2021-03	RAN#91	RP-210122	1560		A	Update on interruption test cases for Tx switching R17	17.1.0
2021-03	RAN#91	RP-210076	1562		A	Maintenance CR for CSI-RS based L3 measurement requirements R17	17.1.0
2021-03	RAN#91	RP-210116	1565		A	Correction on the power of the first preamble for random access in EN-DC and SA in R17	17.1.0
2021-03	RAN#91	RP-210116	1568		A	Correction on the time for Scell activation and CSI-report in R17	17.1.0
2021-03	RAN#91	RP-210116	1571		A	Correction on the Noc level in TS38.133 in R17	17.1.0
2021-03	RAN#91	RP-210079	1578		A	CR on TS38.133 for Pcell change	17.1.0
2021-03	RAN#91	RP-210071	1586		A	CR on TS38.133 for inter-frequency measurement requirement without gap	17.1.0
2021-03	RAN#91	RP-210122	1600		A	Big CR: Introduction of Rel-16 NR RRM enhancements WI performance requirements and test cases (Rel-17)	17.1.0
2021-03	RAN#91	RP-210084	1602		A	CR: Introduction of random access requirements with CCA	17.1.0
2021-03	RAN#91	RP-210084	1604		A	CR: Beam management requirements with CCA	17.1.0
2021-03	RAN#91	RP-210117	1607		A	CR on the filter for beam failure indications in 38.133	17.1.0
2021-03	RAN#91	RP-210116	1616		A	Correction to Aperiodic CSI-RS configurations R17	17.1.0
2021-03	RAN#91	RP-210116	1619		A	Correction to radio link monitoring test cases R17	17.1.0

2021-03	RAN#91	RP-210116	1622		A	Correction to beam failure recovery test cases R17	17.1.0
2021-03	RAN#91	RP-210116	1625		A	Correction to L1-RSRP reporting delay test cases R17	17.1.0
2021-03	RAN#91	RP-210084	1631		A	CR on measurement requirements for NR-U	17.1.0
2021-03	RAN#91	RP-210122	1636		A	CR on maintaining Antenna configurations in TS38.133 R17	17.1.0
2021-03	RAN#91	RP-210122	1639		A	CR on test requirements for measurement performance tests R17	17.1.0
2021-03	RAN#91	RP-210070	1643		A	CR on maintaining L1-SINR measurent requirements Rel-17	17.1.0
2021-03	RAN#91	RP-210093	1646	1	F	CR on condition requirements for UE power class 5 in TS38.133	17.1.0
2021-03	RAN#91	RP-210071	1648		A	Correction on interruptions of SRS carrier switching	17.1.0
2021-03	RAN#91	RP-210071	1652		A	UL spatial relation switching to an unknown DL RS	17.1.0
2021-03	RAN#91	RP-210116	1655		A	Correction on test cases of inter-frequency Measurements R17	17.1.0
2021-03	RAN#91	RP-210122	1660		A	Correction on test cases of DL interruptions at switching between two uplink carriers	17.1.0
2021-03	RAN#91	RP-210081	1670		A	CR to 38.133 correction on CCSF for NR measurements for positioning	17.1.0
2021-03	RAN#91	RP-210072	1672		A	CR to 38.133 correction on reselection of V2X synchronization reference source requirements	17.1.0
2021-03	RAN#91	RP-210066	1675		A	Test case for cell reselection to FR2 intra-frequency NR case for UE configured with relaxed measurement	17.1.0
2021-03	RAN#91	RP-210076	1679		A	Correction on CSSFoutsidegap	17.1.0
2021-03	RAN#91	RP-210077	1683		A	Correction on inter-RAT measurement in high speed scenario	17.1.0
2021-03	RAN#91	RP-210085	1690		A	Correction on inter-RAT E-UTRAN cells for UE configured with relaxed measurement criterion	17.1.0
2021-03	RAN#91	RP-210084	1691		A	Maintenance CR for NR-U core requirements	17.1.0
2021-03	RAN#91	RP-210091	1697		A	Correction of band group notation for FR2	17.1.0
2021-03	RAN#91	RP-210087	1699		A	Correction to Idle Mode CA/DC Measurements for Inactive mode	17.1.0
2021-03	RAN#91	RP-210087	1701		A	CR clarifying the UE measurement requirements for an SCell with dormant BWP	17.1.0
2021-03	RAN#91	RP-210087	1703		A	Correction to simultaneous DCI based BWP switch delay on multiple CCs	17.1.0
2021-03	RAN#91	RP-210116	1714		A	CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (Rel-17)	17.1.0
2021-03	RAN#91	RP-210071	1721		A	CR 38.133 (8.6.2A) Clarification on DCI-triggered BWP switch on multiple CCs	17.1.0
2021-03	RAN#91	RP-210084	1723		A	Updates in RLM requirements for NR-U	17.1.0
2021-03	RAN#91	RP-210084	1727		A	Terminology updates for NR-U in 38.133	17.1.0
2021-03	RAN#91	RP-210081	1733		A	PRS-RSRP measurement requirements	17.1.0
2021-03	RAN#91	RP-210076	1737		A	38.133 CR on the CSI-RS based measurement requirements	17.1.0
2021-03	RAN#91	RP-210084	1739		A	Applicability of RA with CCA on RRM requirements in NR-U in 38.133	17.1.0
2021-03	RAN#91	RP-210084	1744		A	CR on Active TCI state switching for NR-U (cat A)	17.1.0
2021-03	RAN#91	RP-210071	1746		A	CR on maintenance on BWP switch requirements on multiple CCs (cat A)	17.1.0
2021-03	RAN#91	RP-210116	1751		A	CR on test cases for inter-RAT measurement r17	17.1.0
2021-03	RAN#91	RP-210117	1754		A	CR on SCell activation delay, cell idenfication requirements on deactivated SCell and inter-RAT ECID requirements for NE-DC R17	17.1.0
2021-03	RAN#91	RP-210116	1757		A	CR on SCell activation TCs R17	17.1.0
2021-03	RAN#91	RP-210087	1759		A	CR on EMR requirement maintenance in 38.133 R17	17.1.0
2021-03	RAN#91	RP-210087	1761		A	CR on SCell dormancy switching R17	17.1.0
2021-03	RAN#91	RP-210071	1771		A	CR on multiple SCell activation requirements R17	17.1.0
2021-03	RAN#91	RP-210071	1773		A	CR on CGI reading requirements 38.133 R17	17.1.0
2021-03	RAN#91	RP-210116	1781		A	Cat-A CR to addition of TRS Configurations in Rel-17 Test Cases	17.1.0
2021-03	RAN#91	RP-210091	1788		A	Cat-A CR to addition of TRS Configurations in Rel-17 Test Case	17.1.0
2021-03	RAN#91	RP-210116	1790		A	CR on correcting SSB and RACH configuration in CSI-RS based beam failure detection and link recovery tests	17.1.0
2021-03	RAN#91	RP-210084	1792		A	CR on Interruptions during Scell activation in NR-U	17.1.0
2021-03	RAN#91	RP-210076	1796		A	CR on core requirement for CSI-RS L3 measurement	17.1.0
2021-03	RAN#91	RP-210091	1797		A	Maintenance CR on interruption at EUTRA SRS carrier switching in 38.133	17.1.0
2021-03	RAN#91	RP-210091	1798		A	Maintenance CR on SCell activation delay requirement in TS38.133	17.1.0
2021-03	RAN#91	RP-210081	1799		A	CR to TS 38.133 on UE Rx-Tx time difference measurements (section 9.9.4)	17.1.0
2021-03	RAN#91	RP-210077	1801		F	CR on introduction of missing HST test cases	17.1.0
2021-06	RAN#92	RP-211083	1809		A	CR to A.3.14 CSI-RS configurations for nzp-CSI-RS-ResourceId values	17.2.0
2021-06	RAN#92	RP-211083	1812		A	CR to Interruptions during measurements on deactivated NR SCC	17.2.0
2021-06	RAN#92	RP-211083	1815		A	CR to CSI-RS based L1-RSRP measurement on resource set with repetition off TCs	17.2.0
2021-06	RAN#92	RP-211084	1818		A	CR to the notation of SMTC in the general test parameters of Re-establishment TCs	17.2.0
2021-06	RAN#92	RP-211084	1821		A	CR to BWP configuration for interruption test case.	17.2.0
2021-06	RAN#92	RP-211084	1827		A	Update of DRX configuration in Event-triggered Test cases	17.2.0
2021-06	RAN#92	RP-211084	1833		A	Update RRM Test cases where 66RBs gives insufficient dB range	17.2.0

2021-06	RAN#92	RP-211084	1836		A	Update Reference channels and OCNG for FR2 240kHz SSB SCS RRM Test cases	17.2.0
2021-06	RAN#92	RP-211084	1839		A	Cat-A CR to Cell Reselection Tests with Async Cells in Rel-17	17.2.0
2021-06	RAN#92	RP-211085	1841		A	Cat-A CR to Cell Reselection Tests with Async Cells in Rel-17	17.2.0
2021-06	RAN#92	RP-211085	1844		A	Cat-A CR to FR2 CORESET and Search Space RMC in Rel-17	17.2.0
2021-06	RAN#92	RP-211085	1847		A	Cat-A CR to PDSCH RMC in Rel-17	17.2.0
2021-06	RAN#92	RP-211085	1850		A	Cat-A CR to TRS Configuration in Rel-17 Test Case	17.2.0
2021-06	RAN#92	RP-211085	1852		A	Cat-A CR to FR1 Single SCell activation requirement with TCI activation in Rel-17	17.2.0
2021-06	RAN#92	RP-211085	1857		A	Maintenance CR for test cases - R17 Cat A	17.2.0
2021-06	RAN#92	RP-211104	1859		A	Correction to cell reselection test case for HST	17.2.0
2021-06	RAN#92	RP-211104	1861		A	Correction to cell reselection test case for UE Power saving	17.2.0
2021-06	RAN#92	RP-211085	1864		A	CR on BFD and link recovery test cases	17.2.0
2021-06	RAN#92	RP-211101	1867		A	CR on CSI-RS intra-frequency requirement and scheduling restriction	17.2.0
2021-06	RAN#92	RP-211101	1868		A	CR on CSI-RS based measurement requirements	17.2.0
2021-06	RAN#92	RP-211103	1872		A	CR on PRS RSTD measurement requirements	17.2.0
2021-06	RAN#92	RP-211101	1876		A	CR for clarification on frequency layer merging R17	17.2.0
2021-06	RAN#92	RP-211104	1878		A	CR on legacy Rel-16 HST NR UE measurement requirements (R17)	17.2.0
2021-06	RAN#92	RP-211097	1880		A	CR on RRC based BWP switching on multiple CCs of EN-DC for FR1 (R17)	17.2.0
2021-06	RAN#92	RP-211104	1882		A	Correction on the power of the first preamble for 2-step RACH	17.2.0
2021-06	RAN#92	RP-211095	1883		A	Terminology update for NR-U	17.2.0
2021-06	RAN#92	RP-211086	1887		A	Maintenance on CSSF for EN-DC and deactivated SCell measurement R17	17.2.0
2021-06	RAN#92	RP-211095	1889		A	CR on reference cell availability for NR-U R17	17.2.0
2021-06	RAN#92	RP-211095	1891		A	CR on SCell activation requirement for NR-U R17	17.2.0
2021-06	RAN#92	RP-211097	1893		A	CR on interruption for SCell addition/release R17	17.2.0
2021-06	RAN#92	RP-211086	1898		A	Core requirement maintenance on signal characteristics (R17)	17.2.0
2021-06	RAN#92	RP-211104	1902		A	CR to 38.133 on Link recovery requirements - R17	17.2.0
2021-06	RAN#92	RP-211097	1907		A	CR to introduce testcase for RRC based BWP switch on multiple CCs- SA in FR2 -R17	17.2.0
2021-06	RAN#92	RP-211097	1908		A	CR to 38.133 on Uplink Spatial relation switch for PUCCH - R17	17.2.0
2021-06	RAN#92	RP-211102	1912	1	A	CR on CSSFintra for HST measurement requirements	17.2.0
2021-06	RAN#92	RP-211102	1914	1	F	CR on test case on NR intra-frequency cell reselection for HST	17.2.0
2021-06	RAN#92	RP-211097	1924		A	CR for test cases for simultaneous DCI and Timer based BWP switch on multiple CCs for NR SA	17.2.0
2021-06	RAN#92	RP-211081	1930	1	A	Correction on the SS-RSRP difference value for SS-RSRP measurement TC in R17	17.2.0
2021-06	RAN#92	RP-211081	1933	1	A	Correction on the CSI-reporting period for SCell activation delay in R17	17.2.0
2021-06	RAN#92	RP-211103	1935	1	A	Introduce the SCell beam failure recovery without the dedicated PUCCH resource in R17	17.2.0
2021-06	RAN#92	RP-211086	1940		A	CR on scheduling restriction of UE during intra-frequency measurements on FR2 in R17	17.2.0
2021-06	RAN#92	RP-211119	1942		A	CR on TS38.133 for direct Scell activation	17.2.0
2021-06	RAN#92	RP-211097	1944		A	CR on TS38.133 for typo modifications on intra frequency and inter frequency measurement requirement	17.2.0
2021-06	RAN#92	RP-211097	1946		A	CR to 38.133 correction on SRS carrier based switching core requirements	17.2.0
2021-06	RAN#92	RP-211097	1948		A	CR to 38.133 correction on SRS carrier based switching test cases	17.2.0
2021-06	RAN#92	RP-211101	1950		A	CR to 38.133 Correction on core requirements for CSI-RS based measurement	17.2.0
2021-06	RAN#92	RP-211105	1954		A	CR to 38.133 correction on CCSF for NR measurements for positioning	17.2.0
2021-06	RAN#92	RP-211097	1959		A	CR on TS38.133 inter-frequency without gap -r17 NOTE Part of the CR is not implemented because changes to clause 9.1.5.1 have no track marks.	17.2.0
2021-06	RAN#92	RP-211105	1970		A	CR to 38.133 Correction on the requirement of FR2 L1-SINR measurement accuracy (Rel-17)	17.2.0
2021-06	RAN#92	RP-211116	1974		B	CR to TS 38.133: Introduction of band n67	17.2.0
2021-06	RAN#92	RP-211116	1975		B	CR to TS 38.133: Introduction of band n85	17.2.0
2021-06	RAN#92	RP-211106	1977		A	CR on UE Rx-Tx time difference measurement period	17.2.0
2021-06	RAN#92	RP-211087	1983		A	CR to TS 38.133: Correction of TDD Configuration for several TCs (Rel-17)	17.2.0
2021-06	RAN#92	RP-211087	1986		A	CR to TS 38.133: Correction of OCNG pattern for several TCs (Rel-17)	17.2.0
2021-06	RAN#92	RP-211087	1989		A	CR to TS 38.133: Correction of IRAT TCs (Rel-17)	17.2.0
2021-06	RAN#92	RP-211087	1992		A	CR to TS 38.133: Corrections to SS-RSRP/RSRQ/SINR accuracy TCs (Rel 17)	17.2.0
2021-06	RAN#92	RP-211087	1995		A	CR to TS 38.133: Several corrections to TCs (Rel 17)	17.2.0
2021-06	RAN#92	RP-211087	1997		F	CR on maintaining condition requirements in TS38.133 R17	17.2.0

2021-06	RAN#92	RP-211106	1999		A	CR on maintaining L1-SINR measuremt accuracy requirements R17	17.2.0
2021-06	RAN#92	RP-211106	2001		A	CR on maintaining L1-SINR measurement accuracy tests R17	17.2.0
2021-06	RAN#92	RP-211106	2003		A	CR on maintaining L1-SINR measuremt requirements R17	17.2.0
2021-06	RAN#92	RP-211097	2005		A	CR on maintaining SCell activation and deactication delay test for FR2 inter-band CA R17	17.2.0
2021-06	RAN#92	RP-211106	2007		A	CR on maintaining sync conditions for intra-band DAPS handover R17	17.2.0
2021-06	RAN#92	RP-211106	2009		A	CR on maintaining interruptions for intra-band DAPS handover R17	17.2.0
2021-06	RAN#92	RP-211107	2014		F	CR on maintaining condition requirements for UE power class 5	17.2.0
2021-06	RAN#92	RP-211095	2020		A	CR on Active TCI state switching for NR-U R17	17.2.0
2021-06	RAN#92	RP-211095	2022		A	CR on RLM requirements NR-U R17	17.2.0
2021-06	RAN#92	RP-211095	2024		A	CR on beam management requirements for NR-U R17	17.2.0
2021-06	RAN#92	RP-211095	2026		A	CR on measurement requirements for NR-U R17	17.2.0
2021-06	RAN#92	RP-211095	2028		A	CR on CSSF for NR-U R17	17.2.0
2021-06	RAN#92	RP-211098	2030		A	CR on maintenance of BWP Switch on multiple CCs 38133 R17	17.2.0
2021-06	RAN#92	RP-211087	2033		A	CR on measurement on deactivated SCell and interruption to NR serving cells for measurements on deactivated NR SCell	17.2.0
2021-06	RAN#92	RP-211101	2037		A	CR on time validity of the detected associatedSSB	17.2.0
2021-06	RAN#92	RP-211107	2041		A	Correction on test cases for inter-RAT cell identification in connected mode for HST	17.2.0
2021-06	RAN#92	RP-211101	2045		A	Adding intra-frequency CSI-RS measurement in CSSF	17.2.0
2021-06	RAN#92	RP-211098	2051		A	Correction on SRS carrier switching	17.2.0
2021-06	RAN#92	RP-211103	2053	1	F	CR on condition requirements for L1-SINR measurements R17	17.2.0
2021-06	RAN#92	RP-211109	2055		A	Correction of test case of link recovery with link recovery requests	17.2.0
2021-06	RAN#92	RP-211088	2058		A	Correction to CSI-RS reference configuration_R17	17.2.0
2021-06	RAN#92	RP-211088	2062		A	Correction to reference configurations related to DLBWP.0.2_R17	17.2.0
2021-06	RAN#92	RP-211089	2065		A	Correction to TRS reference configuration_R17	17.2.0
2021-06	RAN#92	RP-211089	2068		A	Correction to interruption during measurement on deactivated SCell test cases_R17	17.2.0
2021-06	RAN#92	RP-211089	2071		A	Correction to FR1 test cases using DLBWP.0.2_R17	17.2.0
2021-06	RAN#92	RP-211089	2076		A	Correction of test parameters for SA inter-frequency event triggered reporting TCs	17.2.0
2021-06	RAN#92	RP-211089	2078		A	CR on Rel-15 SCell activation, SMTC determination and UL timing 38133 R17	17.2.0
2021-06	RAN#92	RP-211119	2080		A	CR on EMR requirements correction 38133 R17	17.2.0
2021-06	RAN#92	RP-211119	2082		A	CR on direct SCell activation R17	17.2.0
2021-06	RAN#92	RP-211119	2084		A	CR on SCell dormancy requirements R17	17.2.0
2021-06	RAN#92	RP-211109	2086		A	CR on MG for PRS measurement 38.133 R17	17.2.0
2021-06	RAN#92	RP-211109	2094		A	CR on CSSF and measurement capability for PRS measurement 38.133 R17	17.2.0
2021-06	RAN#92	RP-211098	2096		A	CR on SSB offset in multiple SCell activation R17	17.2.0
2021-06	RAN#92	RP-211098	2098		A	CR on SMTC alignment in multiple SCell activation R17	17.2.0
2021-06	RAN#92	RP-211101	2100		A	CR on CSI-RS measurement window R17	17.2.0
2021-06	RAN#92	RP-211119	2105		A	Big CR 38.133: Introduction of Rel-16 MR-DC Direct SCell activation and SCell dormancy RRM performance requirements NOTE Part of the CR is not implemented because CCR.2.3 TDD" are already exist	17.2.0
2021-06	RAN#92	RP-211090	2111		A	CR on NR-DC PSCell addition and release delay in Rel17 - Cat A	17.2.0
2021-06	RAN#92	RP-211090	2114		A	Maintenance CR for RRM test cases in Rel17 - Cat A	17.2.0
2021-06	RAN#92	RP-211098	2118		A	CR on test case for RRC-based BWP switch on multiple CCs - TC3 in Rel-17 - Cat A	17.2.0
2021-06	RAN#92	RP-211110	2121		A	Changes to cell reselection tests under power saving	17.2.0
2021-06	RAN#92	RP-211119	2127		A	CR for Direct SCell activation delay	17.2.0
2021-06	RAN#92	RP-211119	2131		A	CR Correction of activation delay for Direct activated SCell	17.2.0
2021-06	RAN#92	RP-211091	2139		A	Correction to AoA setup in FR2	17.2.0
2021-06	RAN#92	RP-211091	2141		A	Correction to AoA setup and beam assumptions in FR2 tests in Rel-16	17.2.0
2021-06	RAN#92	RP-211110	2143		A	Correction to beam assumptions in L1-SINR FR2 tests	17.2.0
2021-06	RAN#92	RP-211098	2145		A	Correction to beam assumptions in FR2 tests on Rel-16 Mandatory gaps	17.2.0
2021-06	RAN#92	RP-211098	2147		A	Correction to beam assumptions in FR2 tests on UL spatial relation	17.2.0
2021-06	RAN#92	RP-211110	2149		A	Correction to HO tests in FR2 under mobility enhancements	17.2.0
2021-06	RAN#92	RP-211110	2153		A	PRS-RSRP measurement requirements	17.2.0
2021-06	RAN#92	RP-211101	2159		A	(R17mirror) CR: RRM congestion control test cases for NR V2X	17.2.0
2021-06	RAN#92	RP-211098	2160		A	(R17mirror) CR: CGI reading test	17.2.0
2021-06	RAN#92	RP-211098	2161		A	(R17mirror) CR: UL spatial relation test	17.2.0
2021-06	RAN#92	RP-211095	2163		A	Interruption during Scell activation requirements for SCells operating with CCA	17.2.0
2021-06	RAN#92	RP-211095	2165		A	SI reading time in RRC mobility control	17.2.0
2021-06	RAN#92	RP-211095	2169		A	Updates in SCell activation in NR-U	17.2.0

2021-06	RAN#92	RP-211095	2171		A	NR-U bands	17.2.0
2021-06	RAN#92	RP-211095	2173		A	Big CR: Introduction of Rel-16 NR-U RRM performance	17.2.0
2021-06	RAN#92	RP-211119	2175		A	CR for core requirement maintenance on direct SCell activation R17	17.2.0
2021-06	RAN#92	RP-211119	2177		A	Big CR: Introduction of Rel-16 MR-DC EMR RRM performance requirements (TS 38.133) NOTE Part of the CR is not implemented because new clause have no reference point	17.2.0
2021-06	RAN#92	RP-211097	2179		A	CR on introducing RRC based Active BWP Switch on multiple CCs in EN-DC FR2	17.2.0
2021-06	RAN#92	RP-211101	2182		A	Big CR: Introduction of Rel-16 CSI-RS based L3 measurement RRM performance requirements	17.2.0
2021-06	RAN#92	RP-211096	2184		A	Big CR: Introduction of Rel-16 NR Positioning RRM performance requirements and test cases	17.2.0
2021-06	RAN#92	RP-211121	2185		B	Big CR: RRM requirements for band n262 in 38.133	17.2.0
2021-09	RAN#93	RP-211902	2196		B	RRM requirements for FR2 FWA for band n259 in 38.133	17.3.0
2021-09	RAN#93	RP-211922	2199		A	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-17)	17.3.0
2021-09	RAN#93	RP-211925	2202		A	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 1 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211925	2205		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 2 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211925	2208		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 3 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211890	2210		A	Big CR to TS 38.133: NR_unlic maintenance Part 1 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211890	2212		A	Big CR to TS 38.133: NR_unlic maintenance Part 2 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211893	2214		F	Big CR to TS 38.133: NR_pos maintenance (Rel-17)	17.3.0
2021-09	RAN#93	RP-211891	2216		A	Big CR to TS 38.133: Rel-16 WIs RRM maintenance Part 1 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211893	2218		F	Big CR to TS 38.133: Rel-16 WIs RRM maintenance Part 2 (Rel-17)	17.3.0