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Technical Specification

3rd Generation Partnership Project;
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NR;
User Equipment (UE) radio access capabilities
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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document defines the NR UE Radio Access Capability Parameters.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception Part 1: Range 1 Standalone".

[3] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception Part 2: Range 2 Standalone".

[4] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception Part 3: Range 1 and Range 2 Interworking operation with other radios".

[5] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

[6] 3GPP TS 38.211: "NR; Physical channels and modulation".

[7] 3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR Multi-connectivity".

[8] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[9] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".

[10] 3GPP TS 38.212: "NR; Multiplexing and channel coding".

[11] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[12] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[13] 3GPP TS 38.215: "NR; Physical layer measurements".

[14] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA) radio transmission and reception".

[15] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE) radio access capabilities".

[16] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[17] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".

[18] 3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception Part 4: Performance requirements".

[19] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".

[20] 3GPP TS 38.304: "User Equipment (UE) procedures in Idle mode and RRC Inactive state".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Fallback band combination: A band combination that would result from another band combination by releasing at least one SCell or uplink configuration of SCell, or SCG. An intra-band non-contiguous band combination is not considered to be a fallback band combination of an intra-band contiguous band combination.

Fallback per band feature set: A feature set per band that has same or lower values than the reported values from the reported feature set per band for a given band.

Fallback per CC feature set: A feature set per CC that has lower value of UE supported MIMO layers and BW while keeping the numerology and other parameters the same from the reported feature set per CC for a given carrier per band.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

MaxDLDataRate: Maximum DL data rate
MaxDLDataRate_MN: Maximum DL data rate in the MN
MaxDLDataRate_SN: Maximum DL data rate in the SN
MaxULDataRate: Maximum UL data rate

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

BC Band Combination
DL Downlink
FS Feature Set
FSPC Feature Set Per Component-carrier
MAC Medium Access Control
MCG Master Cell Group
MN Master Node
MR-DC Multi-RAT Dual Connectivity
PDCP Packet Data Convergence Protocol
RLC Radio Link Control
RTT Round Trip Time
SCG Secondary Cell Group
SDAP Service Data Adaptation Protocol
SN Secondary Node
UL Uplink

4 UE radio access capability parameters

4.1 Supported max data rate

4.1.1 General

The DL and UL max data rate supported by the UE is calculated by band or band combinations supported by the UE. A UE supporting NR (NR SA, MR-DC) shall support the calculated DL and UL max data rate defined in 4.1.2.

4.1.2 Supported max data rate

For NR, the approximate data rate for a given number of aggregated carriers in a band or band combination is computed as follows.

$$\text{data rate (in Mbps)} = 10^{-6} \cdot \sum_{j=1}^{J} \left(v_{Layers}^{(j)} \cdot Q_m^{(j)} \cdot f^{(j)} \cdot R_{\max} \cdot \frac{N_{PRB}^{BW(j),\mu} \cdot 12}{T_s^{\mu}} \cdot \left(1 - OH^{(j)}\right) \right)$$

wherein

J is the number of aggregated component carriers in a band or band combination
R_{max} = 948/1024
For the j-th CC,

$v_{Layers}^{(j)}$ is the maximum number of supported layers given by higher layer parameter *maxNumberMIMO-LayersPDSCH* for downlink and maximum of higher layer parameters *maxNumberMIMO-LayersCB-PUSCH* and *maxNumberMIMO-LayersNonCB-PUSCH* for uplink.

$Q_m^{(j)}$ is the maximum supported modulation order given by higher layer parameter *supportedModulationOrderDL* for downlink and higher layer parameter *supportedModulationOrderUL* for uplink.

$f^{(j)}$ is the scaling factor given by higher layer parameter *scalingFactor* and can take the values 1, 0.8, 0.75, and 0.4.

μ is the numerology (as defined in TS 38.211 [6])

T_s^{μ} is the average OFDM symbol duration in a subframe for numerology μ, i.e. $T_s^{\mu} = \frac{10^{-3}}{14 \cdot 2^{\mu}}$. Note that normal cyclic prefix is assumed.

$N_{PRB}^{BW(j),\mu}$ is the maximum RB allocation in bandwidth $BW^{(j)}$ with numerology μ, as defined in 5.3 TS 38.101-1 [2] and 5.3 TS 38.101-2 [3], where $BW^{(j)}$ is the UE supported maximum bandwidth in the given band or band combination.

$OH^{(j)}$ is the overhead and takes the following values

0.14, for frequency range FR1 for DL
0.18, for frequency range FR2 for DL
0.08, for frequency range FR1 for UL
0.10, for frequency range FR2 for UL

NOTE: Only one of the UL or SUL carriers (the one with the higher data rate) is counted for a cell operating SUL.

The approximate maximum data rate can be computed as the maximum of the approximate data rates computed using the above formula for each of the supported band or band combinations.

For single carrier NR SA operation, the UE shall support a data rate for the carrier that is no smaller than the data rate computed using the above formula, with $J = 1$ CC and component $v_{Layers}^{(j)} \cdot Q_m^{(j)} \cdot f^{(j)}$ is no smaller than 4.

NOTE: As an example, the value 4 in the component above can correspond to $v_{Layers}^{(j)} = 1$, $Q_m^{(j)} = 4$ and $f^{(j)} = 1$.

For EUTRA in case of MR-DC, the approximate data rate for a given number of aggregated carriers in a band or band combination is computed as follows.

Data rate (in Mbps) = $10^{-3} \cdot \sum_{j=1}^{J} TBS_j$

wherein

J is the number of aggregated EUTRA component carriers in MR-DC band combination

TBS_j is the total maximum number of DL-SCH transport block bits received or the total maximum number of UL-SCH transport block bits transmitted, within a 1ms TTI for j-th CC, as derived from TS36.213 [19] based on the UE supported maximum MIMO layers for the j-th CC, and based on the maximum modulation order for the j-th CC and number of PRBs based on the bandwidth of the j-th CC according to indicated UE capabilities.

The approximate maximum data rate can be computed as the maximum of the approximate data rates computed using the above formula for each of the supported band or band combinations.

For MR-DC, the approximate maximum data rate is computed as the sum of the approximate maximum data rates from NR and EUTRA.

4.1.3 Void

4.1.4 Total layer 2 buffer size

The total layer 2 buffer size is defined as the sum of the number of bytes that the UE is capable of storing in the RLC transmission windows and RLC reception and reordering windows and also in PDCP reordering windows for all radio bearers.

The required total layer 2 buffer size in MR-DC and NR-DC is the maximum value of the calculated values based on the following equations:

- *MaxULDataRate_MN * RLCRTT_MN + MaxULDataRate_SN * RLCRTT_SN + MaxDLDataRate_SN * RLCRTT_SN + MaxDLDataRate_MN * (RLCRTT_SN + X2/Xn delay + Queuing in SN)*

- *MaxULDataRate_MN * RLCRTT_MN + MaxULDataRate_SN * RLCRTT_SN + MaxDLDataRate_MN * RLCRTT_MN + MaxDLDataRate_SN * (RLCRTT_MN + X2/Xn delay + Queuing in MN)*

Otherwise it is calculated by *MaxDLDataRate * RLC RTT + MaxULDataRate * RLC RTT*.

NOTE: Additional L2 buffer required for preprocessing of data is not taken into account in above formula.

The required total layer 2 buffer size is determined as the maximum total layer 2 buffer size of all the calculated ones for each band combination and the applicable Feature Set combination in the supported MR-DC or NR band combinations. The RLC RTT for NR cell group corresponds to the smallest SCS numerology supported in the band combination and the applicable Feature Set combination.

wherein

X2/Xn delay + Queuing in SN = 25ms if SCG is NR, and 55ms if SCG is EUTRA

X2/Xn delay + Queuing in MN = 25ms if MCG is NR, and 55ms if MCG is EUTRA

RLC RTT for EUTRA cell group = 75ms

RLC RTT for NR cell group is defined in Table 4.1.4-1

Table 4.1.4-1: RLC RTT for NR cell group per SCS

SCS (KHz)	RLC RTT (ms)
15KHz	50
30KHz	40
60KHz	30
120KHz	20

4.2 UE Capability Parameters

4.2.1 Introduction

The following clauses define the UE radio access capability parameters. Only parameters for which there is the possibility for UEs to signal different values are considered as UE radio access capability parameters. Therefore, mandatory features without capability parameters that are the same for all UEs are not listed here.

The network needs to respect the signalled UE radio access capability parameters when configuring the UE and when scheduling the UE.

The UE may support different functionalities between FDD and TDD, and/or between FR1 and FR2. The UE shall indicate the UE capabilities as follows. In the table of UE capability parameter in subsequent clauses, "Yes" in the column by "FDD-TDD DIFF" and "FR1-FR2 DIFF" indicates the UE capability field can have a different value for between FDD and TDD or between FR1 and FR2 and "No" indicates if it cannot. "FD" in the column indicates to refer the associated field description. "FR1 only" or "FR2 only" in the column indicates the associated feature is only supported in FR1 or FR2 and "TDD only" indicates the associated feature is only supported in TDD. "N/A" in the column indicates it is not applicable to the feature (e,g. the signaling supports the UE to have different values between FDD and TDD or between FR1 and FR2).

1> set all fields of UE-NR/MRDC-Capability except fdd-Add-UE-NR/MRDC-Capabilities, tdd-Add-UE-NR/MRDC-Capabilities, fr1-Add-UE-NR/MRDC-Capabilities and fr2-Add-UE-NR/MRDC-Capabilities, to include the values applicable for all duplex mode(s) and frequency range(s) that the UE supports;

1> if UE supports both FDD and TDD and if (some of) the UE capability fields have a different value for FDD and TDD

2> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of UE-NR/MRDC-Capability:

3> include field fdd-Add-UE-NR/MRDC-Capabilities and set it to include fields reflecting the additional functionality applicable for FDD;

2> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of UE-NR/MRDC-Capability:

3> include field tdd-Add-UE-NR/MRDC-Capabilities and set it to include fields reflecting the additional functionality applicable for TDD;

1> if UE supports both FR1 and FR2 and if (some of) the UE capability fields have a different value for FR1 and FR2:

2> if for FR1, the UE supports additional functionality compared to what is indicated by the previous fields of UE-NR/MRDC-Capability:

3> include field fr1-Add-UE-NR/MRDC-Capabilities and set it to include fields reflecting the additional functionality applicable for FR1;

2> if for FR2, the UE supports additional functionality compared to what is indicated by the previous fields of UE-NR/MRDC-Capability:

3> include field fr2-Add-UE-NR/MRDC-Capabilities and set it to include fields reflecting the additional functionality applicable for FR2;

NOTE 1: The fields which indicate "shall be set to 1" or "shall be set to *supported*" in the following tables means these features are purely mandatory and are assumed they are the same as mandatory without capability signaling.

NOTE 2: For the case where the UE is allowed to support different functionality between FDD and TDD and between FR1 and FR2 according to the specification, the UE capability indication is clarified in Annex B.For optional features, the UE radio access capability parameter indicates whether the feature has been implemented and successfully tested. For mandatory features with the UE radio access capability parameter, the parameter indicates whether the feature has been successfully tested. In the table of UE capability parameter in subsequent clauses, "Yes" in the column by "M" indicates the associated feature is mandatory and "No" indicates the associated feature is optional. "CY" in the column indicates the associated feature is conditional mandatory and the condition is described in the field description and the associated feature is considered mandatory with capability parameter, when the described condition is satisfied. "FD" in the column indicates to refer the associated field description. Some parameters in subsequent clauses are not related to UE features and in the case, "N/A" is indicated in the column.

UE capability parameters have hierarchical structure. In the table of UE capability parameter in subsequent clauses, "Per" indicates the level the associated parameter is included. "UE" in the column indicates the associated parameter is signalled per UE, "Band" indicates it is signalled per band, "BC" indicates it is signalled per band combination, "FS" indicates it is signalled per feature set (per band per band combination), "FSPC" indicates it is signalled per feature set per component carrier (per CC per band per band combination), and "FD" in the column indicates to refer the associated field description.

4.2.2 General parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
accessStratumRelease Indicates the access stratum release the UE supports as specified in TS 38.331 [9].	UE	Yes	No	No
delayBudgetReporting Indicates whether the UE supports delay budget reporting as specified in TS 38.331 [9].	UE	No	No	No
inactiveState Indicates whether the UE supports RRC_INACTIVE as specified in TS 38.331 [9].	UE	Yes	No	No
overheatingInd Indicates whether the UE supports overheating assistance information.	UE	No	No	No
partialFR2-FallbackRX-Req Indicates whether the UE meets only a partial set of the UE minimum receiver requirements for the eligible FR2 fallback band combinations as defined in Clause 4.2 of TS 38.101-2 [3] and Clause 4.2 of TS 38.101-3 [4]. If not indicated, the UE shall meet all the UE minimum receiver requirements for all the FR2 fallback combinations in TS 38.101-2 [3] and TS 38.101-3 [4]. The UE shall support configuration of any of the FR2 fallback band combinations regardless of the presence or the absence of this field.	UE	No	No	No
reducedCP-Latency Indicates whether the UE supports reduced control plane latency as defined in TS 38.331 [9]	UE	No	No	No
splitSRB-WithOneUL-Path Indicates whether the UE supports UL transmission via MCG path and DL reception via either MCG path or SCG path, as specified for the split SRB in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*).	UE	No	No	No
splitDRB-withUL-Both-MCG-SCG Indicates whether the UE supports UL transmission via both MCG path and SCG path for the split DRB as specified in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*).	UE	Yes	No	No
srb3 Indicates whether the UE supports direct SRB between the SN and the UE as specified in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*). This field is not applied to NE-DC.	UE	Yes	No	No
v2x-EUTRA Indicates whether the UE supports EUTRA V2X according to *UE-EUTRA-Capability* as defined in TS 36.331 [17], independent of the configured EN-DC band combination. This field is only applied to EN-DC. In UE-NR-Capability, this field is not used, and UE does not include the field.	UE	No	Yes	No

4.2.3 SDAP Parameters

Definitions for parameters	Per	M	FDD-TDD DIFF
as-ReflectiveQoS Indicates whether the UE supports AS reflective QoS.	UE	No	No

4.2.4 PDCP Parameters

Definitions for parameters	Per	M	FDD-TDD DIFF
continueROHC-Context Defines whether the UE supports ROHC context continuation operation where the UE does not reset the current ROHC context upon PDCP re-establishment, as specified in TS 38.323 [16].	UE	No	No
maxNumberROHC-ContextSessions Defines the maximum number of header compression context sessions supported by the UE, excluding context sessions that leave all headers uncompressed.	UE	No	No
outOfOrderDelivery Indicates whether UE supports out of order delivery of data to upper layers by PDCP.	UE	No	No
pdcp-DuplicationMCG-OrSCG-DRB Indicates whether the UE supports CA-based PDCP duplication over MCG or SCG DRB as specified in TS 38.323 [16].	UE	No	No
pdcp-DuplicationSplitDRB Indicates whether the UE supports PDCP duplication over split DRB as specified in TS 38.323 [16].	UE	No	No
pdcp-DuplicationSplitSRB Indicates whether the UE supports PDCP duplication over split SRB1/2 as specified in TS 38.323 [16].	UE	No	No
pdcp-DuplicationSRB Indicates whether the UE supports CA-based PDCP duplication over SRB1/2 and/or, if (NG)EN-DC is supported, SRB3 as specified in TS 38.323 [16].	UE	No	No
shortSN Indicates whether the UE supports 12 bit length of PDCP sequence number.	UE	Yes	No
supportedROHC-Profiles Defines which ROHC profiles from the list below are supported by the UE: - 0x0000 ROHC No compression (RFC 5795) - 0x0001 ROHC RTP/UDP/IP (RFC 3095, RFC 4815) - 0x0002 ROHC UDP/IP (RFC 3095, RFC 4815) - 0x0003 ROHC ESP/IP (RFC 3095, RFC 4815) - 0x0004 ROHC IP (RFC 3843, RFC 4815) - 0x0006 ROHC TCP/IP (RFC 6846) - 0x0101 ROHC RTP/UDP/IP (RFC 5225) - 0x0102 ROHC UDP/IP (RFC 5225) - 0x0103 ROHC ESP/IP (RFC 5225) - 0x0104 ROHC IP (RFC 5225) A UE that supports one or more of the listed ROHC profiles shall support ROHC profile 0x0000 ROHC uncompressed (RFC 5795). An IMS voice capable UE shall indicate support of ROHC profiles 0x0000, 0x0001, 0x0002 and be able to compress and decompress headers of PDCP SDUs at a PDCP SDU rate corresponding to supported IMS voice codecs.	UE	No	No
uplinkOnlyROHC-Profiles Indicates the ROHC profile(s) that are supported in uplink-only ROHC operation by the UE. - 0x0006 ROHC TCP (RFC 6846) A UE that supports uplink-only ROHC profile(s) shall support ROHC profile 0x0000 ROHC uncompressed (RFC 5795).	UE	No	No

4.2.5 RLC parameters

Definitions for parameters	Per	M	FDD-TDD DIFF
am-WithShortSN Indicates whether the UE supports AM DRB with 12 bit length of RLC sequence number.	UE	Yes	No
um-WithLongSN Indicates whether the UE supports UM DRB with 12 bit length of RLC sequence number.	UE	Yes	No
um-WithShortSN Indicates whether the UE supports UM DRB with 6 bit length of RLC sequence number.	UE	Yes	No

4.2.6 MAC parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
lch-ToSCellRestriction Indicates whether the UE supports restricting data transmission from a given LCH to a configured (sub-) set of serving cells (see allowedServingCells in LogicalChannelConfig). A UE supporting pdcp-DuplicationMCG-OrSCG-DRB or pdcp-DuplicationSRB (see PDCP-Config) shall also support lch-ToSCellRestriction.	UE	No	No	No
lcp-Restriction Indicates whether UE supports the selection of logical channels for each UL grant based on RRC configured restriction.	UE	No	No	No
logicalChannelSR-DelayTimer Indicates whether the UE supports the logicalChannelSR-DelayTimer as specified in TS 38.321 [8].	UE	No	Yes	No
longDRX-Cycle Indicates whether UE supports long DRX cycle as specified in TS 38.321 [8].	UE	Yes	Yes	No
multipleConfiguredGrants Indicates whether UE supports more than one configured grant configurations (including both Type 1 and Type 2) in a cell group. For each cell, the UE supports at most one configured grant per BWP and the maximum number of configured grant configurations per cell group is 2. If absent, for each configured cell group, the UE only supports one configured grant configuration on one serving cell.	UE	No	Yes	No
multipleSR-Configurations Indicates whether the UE supports 8 SR configurations per PUCCH cell group as specified in TS 38.321 [8].	UE	No	Yes	No
recommendedBitRate Indicates whether the UE supports the bit rate recommendation message from the gNB to the UE as specified in TS 38.321 [8].	UE	No	No	No
recommendedBitRateQuery Indicates whether the UE supports the bit rate recommendation query message from the UE to the gNB as specified in TS 38.321 [8]. This field is only applicable if the UE supports recommendedBitRate.	UE	No	No	No
shortDRX-Cycle Indicates whether UE supports short DRX cycle as specified in TS 38.321 [8].	UE	Yes	Yes	No
skipUplinkTxDynamic Indicates whether the UE supports skipping of UL transmission for an uplink grant indicated on PDCCH if no data is available for transmission as specified in TS 38.321 [8].	UE	No	Yes	No

4.2.7 Physical layer parameters

4.2.7.1 *BandCombinationList* parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
bandEUTRA Defines supported EUTRA frequency band by NR frequency band number, as specified in TS 36.101 [14].	Band	Yes	N/A	N/A
bandList Each entry of the list should include at least one bandwidth class for UL or DL.	BC	Yes	N/A	N/A
bandNR Defines supported NR frequency band by NR frequency band number, as specified in TS 38.101-1 [2] and TS 38.101-2 [3].	Band	Yes	N/A	N/A
ca-BandwidthClassDL-EUTRA Defines for DL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 36.101 [14]. When all FeatureSetEUTRA-DownlinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent.	Band	No	N/A	N/A
ca-BandwidthClassDL-NR Defines for DL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]. When all FeatureSetDownlinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent. For FR1, the value 'F' shall not be used as it is invalidated in TS 38.101-1 [2].	Band	No	N/A	N/A
ca-BandwidthClassUL-EUTRA Defines for UL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 36.101 [14]. When all FeatureSetEUTRA-UplinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent.	Band	No	N/A	N/A
ca-BandwidthClassUL-NR Defines for UL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by the UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]. When all FeatureSetUplinkId:s in the corresponding FeatureSetsPerBand are zero, this field is absent. For FR1, the value 'F' shall not be used as it is invalidated in TS 38.101-1 [2].	Band	No	N/A	N/A
ca-ParametersEUTRA Contains the EUTRA part of band combination parameters for a given (NG)EN-DC/NE-DC band combination.	BC	No	N/A	N/A
ca-ParametersNR Contains the NR band combination parameters for a given (NG)EN-DC/NE-DC and/or NR CA band combination.	BC	No	N/A	N/A
ca-ParametersNRDC Indicates whether the UE supports NR-DC for the band combination. It contains the NR band combination parameters applicable across MCG and SCG. In this version of the standard, a UE indicating support for NR-DC supports only configuration where all serving cells of the MCG are in FR1 and all serving cells of the SCG are in FR2.	BC	No	N/A	N/A
featureSetCombination Indicates the feature set that the UE supports on the NR and/or MR-DC band combination by FeatureSetCombinationId.	BC	N/A	N/A No	N/A
mrdc-Parameters Contains the band combination parameters for a given (NG)EN-DC/NE-DC band combination.	BC	No	N/A	N/A
ne-DC-BC Indicates whether the UE supports NE-DC for the band combination.	BC	No	N/A	N/A
powerClass Indicates power class the UE supports when operating according to this band combination. If the field is absent, the UE supports the default power class. If this power class is higher than the power class that the UE supports on the individual bands of this band combination (*ue-PowerClass* in *BandNR*), the latter determines maximum TX power available in each band. The UE sets the power class parameter only in band combinations that are applicable as specified in TS 38.101-1 [2] and TS 38.101-3 [4].	BC	No	N/A	FR1 only

SRS-SwitchingTimeNR Indicates the interruption time on DL/UL reception within a NR band pair during the RF retuning for switching between a carrier on one band and another (PUSCH-less) carrier on the other band to transmit SRS. *switchingTimeDL/ switchingTimeUL*: n0us represents 0 us, n30us represents 30us, and so on. *switchingTimeDL/ switchingTimeUL* is mandatory present if switching between the NR band pair is supported, otherwise the field is absent. It is signalled per pair of bands per band combination.	FD	No	N/A	N/A
SRS-SwitchingTimeEUTRA Indicates the interruption time on DL/UL reception within a EUTRA band pair during the RF retuning for switching between a carrier on one band and another (PUSCH-less) carrier on the other band to transmit SRS. *switchingTimeDL/ switchingTimeUL:* n0 represents 0 OFDM symbols, n0dot5 represents 0.5 OFDM symbols, n1 represents 1 OFDM symbol and so on. *switchingTimeDL/ switchingTimeUL* is mandatory present if switching between the EUTRA band pair is supported, otherwise the field is absent. It is signalled per pair of bands per band combination.	FD	No	N/A	N/A
srs-TxSwitch Defines whether UE supports SRS for DL CSI acquisition as defined in clause 6.2.1.2 of TS 38.214 [12]. The capability signalling comprises of the following parameters: - *supportedSRS-TxPortSwitch* indicates SRS Tx port switching pattern supported by the UE. The indicated UE antenna switching capability of 'xTyR' corresponds to a UE, capable of SRS transmission on 'x' antenna ports over total of 'y' antennas, where 'y' corresponds to all or subset of UE receive antennas, where 2T4R is two pairs of antennas; - *txSwitchImpactToRx* indicates the entry number of the first-listed band with UL (see NOTE) in the band combination that affects this DL; - *txSwitchWithAnotherBand* indicates the entry number of the first-listed band with UL (see NOTE) in the band combination that switches together with this UL. For *txSwitchImpactToRx* and *txSwitchWithAnotherBand*, value 1 means first entry, value 2 means second entry and so on. All DL and UL that switch together indicate the same entry number. The entry number is the band entry number in a band combination. The UE is restricted not to include fallback band combinations for the purpose of indicating different SRS antenna switching capabilities. NOTE: The first-listed band with UL includes a band associated with *FeatureSetUplinkId* set to 0 corresponding to the support of *SRS-SwitchingTimeNR*.	BC	Yes	N/A	N/A
supportedBandwidthCombinationSet Defines the supported bandwidth combination for the band combination set as defined in the TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4]. For NR SA CA, NR-DC, inter-band (NG)EN-DC without intra-band (NG)EN-DC component, inter-band NE-DC without intra-band NE-DC component and intra-band (NG)EN-DC/NE-DC with additional inter-band NR CA component, the field defines the bandwidth combinations for the NR part of the band combination. For intra-band (NG)EN-DC/NE-DC without additional inter-band NR and LTE CA component, the field indicates the supported bandwidth combination set applicable to the NR and LTE band combinations. Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. It is mandatory if the band combination has more than one NR carrier (at least one SCell in an NR cell group) or is an intra-band (NG)EN-DC/NE-DC combination or both.	BC	CY	N/A	N/A

supportedBandwidthCombinationSetIntraENDC Defines the supported bandwidth combination for the band combination set as defined in the TS 38.101-3 [4]. For intra-band (NG)EN-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band (NG)EN-DC component. For intra-band NE-DC with additional inter-band CA component(s) of LTE and/or NR, the field defines the bandwidth combinations for the intra-band NE-DC component. Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. It is mandatory if the band combination is an intra-band (NG)EN-DC/NE-DC combination with additional inter-band NR/LTE CA component.	BC	CY	N/A	N/A

4.2.7.2 *BandNR parameters*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
additionalActiveTCI-StatePDCCH Indicates whether the UE supports one additional active TCI-State for control in addition to the supported number of active TCI-States for PDSCH. The UE can include this field only if *maxNumberActiveTCI-PerBWP* in *tci-StatePDSCH* is set to *n1*. Otherwise, the UE does not include this field.	Band	CY	N/A	N/A
aperiodicBeamReport Indicates whether the UE supports aperiodic 'CRI/RSRP' or 'SSBRI/RSRP' reporting on PUSCH. The UE provides the capability for the band number for which the report is provided (where the measurement is performed).	Band	Yes	N/A	N/A
aperiodicTRS Indicates whether the UE supports DCI triggering aperiodic TRS associated with periodic TRS.	Band	No	N/A	N/A
asymmetricBandwidthCombinationSet Defines the supported asymmetric channel bandwidth combination for the band as defined in the TS 38.101-1 [2]. Field encoded as a bit map, where bit N is set to "1" if UE support asymmetric channel bandwidth combination set N for this band as defined in the TS 38.101-1 [2]. The leading / leftmost bit (bit 0) corresponds to the asymmetric channel bandwidth combination set 1, the next bit corresponds to the asymmetric channel bandwidth combination set 2 and so on. UE shall support asymmetric channel bandwidth combination set 0. If the field is absent, the UE supports asymmetric channel bandwidth combination set 0.	Band	No	No	No
bandNR Defines supported NR frequency band by NR frequency band number, as specified in TS 38.101-1 [2] and TS 38.101-2 [3].	Band	Yes	N/A	N/A
beamCorrespondenceWithoutUL-BeamSweeping Indicates how UE supports FR2 beam correspondence as specified in TS 38.101-2 [3], clause 6.6. The UE that fulfils the beam correspondence requirement without the uplink beam sweeping (as specified in TS 38.101-2 [3], clause 6.6) shall set the field to *supported*. The UE that fulfils the beam correspondence requirement with the uplink beam sweeping (as specified in TS 38.101-2 [3], clause 6.6) shall not report this field.	Band	Yes	N/A	FR2 only

beamManagementSSB-CSI-RS Defines support of SS/PBCH and CSI-RS based RSRP measurements. The capability comprises signalling of - *maxNumberSSB-CSI-RS-ResourceOneTx* indicates maximum total number of configured one port NZP CSI-RS resources and SS/PBCH blocks that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] within a slot and across all serving cells (see NOTE). On FR2, it is mandatory to report >=8; On FR1, it is mandatory with capability signalling to report >=8. - *maxNumberCSI-RS-Resource* indicates maximum total number of configured NZP-CSI-RS resources that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] across all serving cells (see NOTE). It is mandated to report at least n8 for FR1. - *maxNumberCSI-RS-ResourceTwoTx* indicates maximum total number of two ports NZP CSI-RS resources that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] within a slot and across all serving cells (see NOTE). - *supportedCSI-RS-Density* indicates density of one RE per PRB for one port NZP CSI-RS resource for RSRP reporting, if supported. On FR2, it is mandatory to report either "three" or "oneAndThree"; On FR1, it is mandatory with capability signalling to report either "three" or "oneAndThree". - *maxNumberAperiodicCSI-RS-Resource* indicates maximum number of configured aperiodic CSI-RS resources across all serving cells (see NOTE). For FR1 and FR2, the UE is mandated to report at least n4. NOTE: If the UE sets a value other than *n0* in an FR1 band, it shall set that same value in all FR1 bands. If the UE sets a value other than *n0* in an FR2 band, it shall set that same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells.	Band	Yes	N/A	FD
beamReportTiming Indicates the number of OFDM symbols between the last symbol of SSB/CSI-RS and the first symbol of the transmission channel containing beam report. The UE provides the capability for the band number for which the report is provided (where the measurement is performed). The UE includes this field for each supported sub-carrier spacing.	Band	Yes	N/A	N/A
beamSwitchTiming Indicates the minimum number of OFDM symbols between the DCI triggering of aperiodic CSI-RS and aperiodic CSI-RS transmission. The number of OFDM symbols is measured from the last symbol containing the indication to the first symbol of CSI-RS. The UE includes this field for each supported sub-carrier spacing. If this field is not included, the beam switch timing is up to 48 OFDM symbols for each supported sub-carrier spacing.	Band	No	N/A	FR2 only
bwp-DiffNumerology Indicates whether the UE supports BWP adaptation up to 4 BWPs with the different numerologies, via DCI and timer. For the UE capable of this feature, the bandwidth of a UE-specific RRC configured DL BWP includes the bandwidth of the CORESET#0 (if CORESET#0 is present) and SSB for PCell and PSCell (if configured). For SCell(s), the bandwidth of the UE-specific RRC configured DL BWP includes SSB, if there is SSB on SCell(s).	Band	No	N/A	N/A
bwp-SameNumerology Indicates whether UE supports BWP adaptation (up to 2/4 BWPs) with the same numerology, via DCI and timer. For the UE capable of this feature, the bandwidth of a UE-specific RRC configured DL BWP includes the bandwidth of the CORESET#0 (if CORESET#0 is present) and SSB for PCell and PSCell (if configured). For SCell(s), the bandwidth of the UE-specific RRC configured DL BWP includes SSB, if there is SSB on SCell(s).	Band	No	N/A	N/A
bwp-WithoutRestriction Indicates support of BWP operation without bandwidth restriction. The Bandwidth restriction in terms of DL BWP for PCell and PSCell means that the bandwidth of a UE-specific RRC configured DL BWP may not include the bandwidth of CORESET #0 (if configured) and SSB. For SCell(s), it means that the bandwidth of DL BWP may not include SSB.	Band	No	N/A	N/A

channelBWs-DL Indicates for each subcarrier spacing the UE supported channel bandwidths. Absence of the *channelBWs-DL* (without suffix) for a band or absence of specific scs-XXkHz entry for a supported subcarrier spacing means that the UE supports the channel bandwidths among [5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100] and [50, 100, 200] that were defined in clause 5.3.5 of TS 38.101-1 version 15.7.0 [2] and TS 38.101-2 version 15.7.0 [3] for the given band or the specific SCS entry. For FR1, the bits in *channelBWs-DL* (without suffix) starting from the leading / leftmost bit indicate 5, 10, 15, 20, 25, 30, 40, 50, 60 and 80MHz. For FR2, the bits in *channelBWs-DL* (without suffix) starting from the leading / leftmost bit indicate 50, 100 and 200MHz. The third / rightmost bit (for 200MHz) shall be set to 1. For FR1, the leading/leftmost bit in *channelBWs-DL-v1590* indicates 70MHz, and all the remaining bits in *channelBWs-DL-v1590* shall be set to 0. NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingDL* and the *scs-60kHz*. To determine whether the UE supports a channel bandwidth of 90 MHz, the network may ignore this capability for and validate instead the *channelBW-90mhz* and the *supportedBandwidthCombinationSet*. For serving cells with other channel bandwidths the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]) and *supportedBandwidthDL*.	Band	Yes	N/A	N/A
channelBWs-UL Indicates for each subcarrier spacing the UE supported channel bandwidths. Absence of the *channelBWs-UL* (without suffix) for a band or absence of specific scs-XXkHz entry for a supported subcarrier spacing means that the UE supports the channel bandwidths among [5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100] and [50, 100, 200] that were defined in clause 5.3.5 of TS 38.101-1 version 15.7.0 [2] and TS 38.101-2 version 15.7.0 [3] for the given band or the specific SCS entry. For FR1, the bits in *channelBWs-UL* (without suffix) starting from the leading / leftmost bit indicate 5, 10, 15, 20, 25, 30, 40, 50, 60 and 80MHz. For FR2, the bits in *channelBWs-UL* (without suffix) starting from the leading / leftmost bit indicate 50, 100 and 200MHz. The third / rightmost bit (for 200MHz) shall be set to 1. For FR1, the leading/leftmost bit in *channelBWs-UL-v1590* indicates 70 MHz, and all the remaining bits in *channelBWs-UL-v1590* shall be set to 0. NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingUL* and the *scs-60kHz*. To determine whether the UE supports a channel bandwidth of 90 MHz the network may ignore this capability for and validate instead the *channelBW-90mhz* and the *supportedBandwidthCombinationSet*. For serving cells with other channel bandwidths the network validates the *channelBWs-UL*, the *supportedBandwidthCombinationSet*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]) and *supportedBandwidthUL*.	Band	Yes	N/A	N/A

codebookParameters
Indicates the codebooks and the corresponding parameters supported by the UE.
 	
Parameters for type I single panel codebook (type1 singlePanel) supported by the UE, which are mandatory to report:
- *supportedCSI-RS-ResourceList*;
  - a UE shall support a *maxNumberTxPortsPerResource* minimum value of 4 for codebook type I single panel in FR1 in the case of a single active CSI-resource across all bands in a band combination, regardless of what it reports in *supportedCSI-RS-ResourceList* with *maxNumberTxPortsPerResource*;
  - a UE shall support a *maxNumberTxPortsPerResource* minimum value of 8 when configured with wideband CSI report for codebook type I single panel in FR1 in the case of a single active CSI-resource across all bands in a band combination, regardless of what it reports in *supportedCSI-RS-ResourceList* with *maxNumberTxPortsPerResource*;
  - a UE shall support a *maxNumberTxPortsPerResource* minimum value of 2 for codebook type I single panel in FR2 in the case of a single active CSI-resource across all bands in a band combination, regardless of what it reports in *supportedCSI-RS-ResourceList* with *maxNumberTxPortsPerResource*.
- *modes* indicates supported codebook modes (mode 1, both mode 1 and mode 2);
- *maxNumberCSI-RS-PerResourceSet* indicates the maximum number of CSI-RS resource in a resource set.
 	
Parameters for type I multi-panel codebook (type1 multiPanel) supported by the UE, which are optional:
- *supportedCSI-RS-ResourceList*;
- *modes* indicates supported codebook modes (mode 1, mode 2, or both mode 1 and mode 2);
- *maxNumberCSI-RS-PerResourceSet* indicates the maximum number of CSI-RS resource in a resource set;
- *nrofPanels* indicates supported number of panels.
 	
Parameters for type II codebook (type2) supported by the UE, which are optional:
- *supportedCSI-RS-ResourceList*;
- *parameterLx* indicates the parameter "Lx" in codebook generation where x is an index of Tx ports indicated by *maxNumberTxPortsPerResource*;
- *amplitudeScalingType* indicates the amplitude scaling type supported by the UE (wideband or both wideband and sub-band);
- *amplitudeSubsetRestriction* indicates whether amplitude subset restriction is supported for the UE.
 	
Parameters for type II codebook with port selection (type2-PortSelection) supported by the UE, which are optional:
- *supportedCSI-RS-ResourceList*;
- *parameterLx* indicates the parameter "Lx" in codebook generation where x is an index of Tx ports indicated by *maxNumberTxPortsPerResource*;
- *amplitudeScalingType* indicates the amplitude scaling type supported by the UE (wideband or both wideband and sub-band).
 	
supportedCSI-RS-ResourceList includes list of the following parameters:
- *maxNumberTxPortsPerResource* indicates the maximum number of Tx ports in a resource;
- *maxNumberResourcesPerBand* indicates the maximum number of resources across all CCs within a band simultaneously;
- *totalNumberTxPortsPerBand* indicates the total number of Tx ports across all CCs within a band simultaneously.
	Band	FD	N/A	N/A

crossCarrierScheduling-SameSCS Indicates whether the UE supports cross carrier scheduling for the same numerology with carrier indicator field (CIF) in carrier aggregation where numerologies for the scheduling cell and scheduled cell are same.	Band	No	N/A	N/A

csi-ReportFramework Indicates whether the UE supports CSI report framework. This capability signalling comprises the following parameters: - *maxNumberPeriodicCSI-PerBWP-ForCSI-Report* indicates the maximum number of periodic CSI report setting per BWP for CSI report; - *maxNumberPeriodicCSI-PerBWP-ForBeamReport* indicates the maximum number of periodic CSI report setting per BWP for beam report. - *maxNumberAperiodicCSI-PerBWP-ForCSI-Report* indicates the maximum number of aperiodic CSI report setting per BWP for CSI report; - *maxNumberAperiodicCSI-PerBWP-ForBeamReport* indicates the maximum number of aperiodic CSI report setting per BWP for beam report; - *maxNumberAperiodicCSI-triggeringStatePerCC* indicates the maximum number of aperiodic CSI triggering states in *CSI-AperiodicTriggerStateList* per CC; - *maxNumberSemiPersistentCSI-PerBWP-ForCSI-Report* indicates the maximum number of semi-persistent CSI report setting per BWP for CSI report; - *maxNumberSemiPersistentCSI-PerBWP-ForBeamReport* indicates the maximum number of semi-persistent CSI report setting per BWP for beam report; - *simultaneousCSI-ReportsPerCC* indicates the number of CSI report(s) for which the UE can measure and process reference signals simultaneously in a CC of the band for which this capability is provided. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in simultaneousCSI-ReportsPerCC includes the beam report and CSI report. The UE is mandated to report *csi-ReportFramework*.	Band	Yes	N/A	N/A
csi-RS-ForTracking Indicates support of CSI-RS for tracking (i.e. TRS). This capability signalling comprises the following parameters: - *maxBurstLength* indicates the TRS burst length. Value 1 indicates 1 slot and value 2 indicates both of 1 slot and 2 slots. In this release UE is mandated to report value 2; - *maxSimultaneousResourceSetsPerCC* indicates the maximum number of TRS resource sets per CC which the UE can track simultaneously; - *maxConfiguredResourceSetsPerCC* indicates the maximum number of TRS resource sets configured to UE per CC. It is mandated to report at least 8 for FR1 and 16 for FR2; - *maxConfiguredResourceSetsAllCC* indicates the maximum number of TRS resource sets configured to UE across CCs. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. The UE is mandated to report at least 16 for FR1 and 32 for FR2. The UE is mandated to report *csi-RS-ForTracking*.	Band	Yes	N/A	N/A

csi-RS-IM-ReceptionForFeedback Indicates support of CSI-RS and CSI-IM reception for CSI feedback. This capability signalling comprises the following parameters: - *maxConfigNumberNZP-CSI-RS-PerCC* indicates the maximum number of configured NZP-CSI-RS resources per CC; - *maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC* indicates the maximum number of ports across all configured NZP-CSI-RS resources per CC; - *maxConfigNumberCSI-IM-PerCC* indicates the maximum number of configured CSI-IM resources per CC; - *maxNumberSimultaneousNZP-CSI-RS-PerCC* indicates the maximum number of simultaneous CSI-RS-resources per CC; - *totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* indicates the total number of CSI-RS ports in simultaneous CSI-RS resources per CC. The UE is mandated to report *csi-RS-IM-ReceptionForFeedback*.	Band	Yes	N/A	N/A
csi-RS-ProcFrameworkForSRS Indicates support of CSI-RS processing framework for SRS. This capability signalling comprises the following parameters: - *maxNumberPeriodicSRS-AssocCSI-RS-PerBWP* indicates the maximum number of periodic SRS resources associated with CSI-RS per BWP; - *maxNumberAperiodicSRS-AssocCSI-RS-PerBWP* indicates the maximum number of aperiodic SRS resources associated with CSI-RS per BWP; - *maxNumberSP-SRS-AssocCSI-RS-PerBWP* indicates the maximum number of semi-persistent SRS resources associated with CSI-RS per BWP; - *simultaneousSRS-AssocCSI-RS-PerCC* indicates the number of SRS resources that the UE can process simultaneously in a CC, including periodic, aperiodic and semi-persistent SRS.	Band	No	N/A	N/A
extendedCP Indicates whether the UE supports 60 kHz subcarrier spacing with extended CP length for reception of PDCCH, and PDSCH, and transmission of PUCCH, PUSCH, and SRS.	Band	No	N/A	N/A
groupBeamReporting Indicates whether UE supports RSRP reporting for the group of two reference signals.	Band	No	N/A	N/A
maxNumberCSI-RS-BFD Indicates maximal number of CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC, for UE to monitor PDCCH quality. In this release, the maximum value that can be signalled is 16. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. It is mandatory with capability signalling for FR2 and optional for FR1.	Band	CY	N/A	N/A
maxNumberCSI-RS-SSB-CBD Defines maximal number of different CSI-RS [and/or SSB] resources across all CCs, and across MCG and SCG in case of NR-DC, for new beam identifications. In this release, the maximum value that can be signalled is 128. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. It is mandatory with capability signalling for FR2 and optional for FR1. The UE is mandated to report at least 32 for FR2.	Band	CY	N/A	N/A
maxNumberNonGroupBeamReporting Defines support of non-group based RSRP reporting using N_max RSRP values reported.	Band	Yes	N/A	N/A

maxNumberRxBeam Defines whether UE supports receive beamforming switching using NZP CSI-RS resource. UE shall indicate a single value for the preferred number of NZP CSI-RS resource repetitions per CSI-RS resource set. Support of Rx beam switching is mandatory for FR2.	Band	CY	N/A	N/A
maxNumberRxTxBeamSwitchDL Defines the number of Tx and Rx beam changes UE can perform on this band within a slot. UE shall report one value per each subcarrier spacing supported by the UE. In this release, the number of Tx and Rx beam changes for scs-15kHz and scs-30kHz are not included.	Band	No	N/A	FR2 only
maxNumberSSB-BFD Defines maximal number of different SSBs across all CCs, and across MCG and SCG in case of NR-DC, for UE to monitor PDCCH quality. In this release, the maximum value that can be signalled is 16. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. It is mandatory with capability signalling for FR2 and optional for FR1.	Band	CY	N/A	N/A
maxUplinkDutyCycle-PC2-FR1 Indicates the maximum percentage of symbols during a certain evaluation period that can be scheduled for uplink transmission so as to ensure compliance with applicable electromagnetic energy absorption requirements provided by regulatory bodies. This field is only applicable for FR1 power class 2 UE as specified in clause 6.2.1 of TS 38.101-1 [2]. If the field is absent, 50% shall be applied. Value n60 corresponds to 60%, value n70 corresponds to 70% and so on.	Band	No	N/A	FR1 only
maxUplinkDutyCycle-FR2 Indicates the maximum percentage of symbols during 1s that can be scheduled for uplink transmission at the UE maximum transmission power, so as to ensure compliance with applicable electromagnetic power density exposure requirements provided by regulatory bodies. This field is applicable for all power classes UE in FR2 as specified in TS 38.101-2 [3]. Value n15 corresponds to 15%, value n20 corresponds to 20% and so on. If the field is absent or the percentage of uplink symbols transmitted within any 1s evaluation period is larger than *maxUplinkDutyCycle-FR2*, the UE behaviour is specified in TS 38.101-2 [3].	Band	No	N/A	FR2 only
modifiedMPR-Behaviour Indicates whether UE supports modified MPR behaviour defined in TS 38.101-1 [2] and TS 38.101-2 [3].	Band	No	N/A	N/A
multipleTCI Indicates whether UE supports more than one TCI state configurations per CORESET. UE is only required to track one active TCI state per CORESET. UE is required to support minimum between 64 and number of configured TCI states indicated by *tci-StatePDSCH*. This field shall be set to *supported*.	Band	Yes	N/A	N/A
pdsch-256QAM-FR2 Indicates whether the UE supports 256QAM modulation scheme for PDSCH for FR2 as defined in 7.3.1.2 of TS 38.211 [6].	Band	No	N/A	FR2 only
periodicBeamReport Indicates whether UE supports periodic 'CRI/RSRP' or 'SSBRI/RSRP' reporting using PUCCH formats 2, 3 and 4 in one slot.	Band	Yes	N/A	N/A
powerBoosting-pi2BPSK Indicates whether UE supports power boosting for pi/2 BPSK, when applicable as defined in 6.2 of TS 38.101-1 [2].	Band	No	TDD only	FR1 only
ptrs-DensityRecommendationSetDL For each supported sub-carrier spacing, indicates preferred threshold sets for determining DL PTRS density. It is mandated for FR2. For each supported sub-carrier spacing, this field comprises: - two values of *frequencyDensity*; - three values of *timeDensity*.	Band	CY	N/A	N/A

ptrs-DensityRecommendationSetUL For each supported sub-carrier spacing, indicates preferred threshold sets for determining UL PTRS density. For each supported sub-carrier spacing, this field comprises: - two values of *frequencyDensity*; - three values of *timeDensity*; - five values of *sampleDensity*.	Band	No	N/A	N/A
pucch-SpatialRelInfoMAC-CE Indicates whether the UE supports indication of *PUCCH-spatialrelationinfo* by a MAC CE per PUCCH resource. It is mandatory for FR2 and optional for FR1.	Band	CY	N/A	N/A
pusch-256QAM Indicates whether the UE supports 256QAM modulation scheme for PUSCH as defined in 6.3.1.2 of TS 38.211 [6].	Band	No	N/A	N/A
pusch-TransCoherence Defines support of the uplink codebook subset by the UE for UL precoding for PUSCH transmission as described in clause 6.1.1.1 of TS 38.214 [12]. UE indicated support of partial coherent codebook subset shall also support non-coherent codebook subset. UE indicated support of full coherent codebook subset shall also support partial and non-coherent codebook subset.	Band	No	N/A	N/A
rateMatchingLTE-CRS Indicates whether the UE supports receiving PDSCH with resource mapping that excludes the REs determined by the higher layer configuration LTE-carrier configuring common RS, as specified in TS 38.214 [12].	Band	Yes	N/A	N/A
spatialRelations Indicates whether the UE supports spatial relations. The capability signalling comprises the following parameters. - *maxNumberConfiguredSpatialRelations* indicates the maximum number of configured spatial relations per CC for PUCCH and SRS. It is not applicable to FR1 and applicable to FR2 only. The UE is mandated to report 16 or higher values; - *maxNumberActiveSpatialRelations* indicates the maximum number of active spatial relations with regarding to PUCCH and SRS for PUSCH, per BWP per CC. It is not applicable to FR1 and applicable and mandatory to report one or higher value for FR2 only; - *additionalActiveSpatialRelationPUCCH* indicates support of one additional active spatial relation for PUCCH. It is mandatory with capability signalling if *maxNumberActiveSpatialRelations* is set to n1; - *maxNumberDL-RS-QCL-TypeD* indicates the maximum number of downlink RS resources used for QCL type D in the active TCI states and active spatial relation information, which is optional. The UE is mandated to report *spatialRelations* for FR2.	Band	FD	N/A	FD
sp-BeamReportPUCCH Indicates support of semi-persistent 'CRI/RSRP' or 'SSBRI/RSRP' reporting using PUCCH formats 2, 3 and 4 in one slot.	Band	No	N/A	N/A
sp-BeamReportPUSCH Indicates support of semi-persistent 'CRI/RSRP' or 'SSBRI/RSRP' reporting on PUSCH.	Band	No	N/A	N/A
srs-AssocCSI-RS Parameters for the calculation of the precoder for SRS transmission based on channel measurements using associated NZP CSI-RS resource (srs-AssocCSI-RS) as described in clause 6.1.1.2 of TS 38.214 [12]. UE supporting this feature shall also indicate support of non-codebook based PUSCH transmission. This capability signalling includes list of the following parameters: - *maxNumberTxPortsPerResource* indicates the maximum number of Tx ports in a resource; - *maxNumberResourcesPerBand* indicates the maximum number of resources across all CCs within a band simultaneously; - *totalNumberTxPortsPerBand* indicates the total number of Tx ports across all CCs within a band simultaneously.	Band	No	N/A	N/A

<table>
<tr><td>tci-StatePDSCH
Defines support of TCI-States for PDSCH. The capability signalling comprises the following parameters:
- maxNumberConfiguredTCIstatesPerCC indicates the maximum number of configured TCI-states per CC for PDSCH. For FR2, the UE is mandated to set the value to 64. For FR1, the UE is mandated to set these values to the maximum number of allowed SSBs in the supported band;

- maxNumberActiveTCI-PerBWP indicates the maximum number of activated TCI-states per BWP per CC, including control and data. If a UE reports X active TCI state(s), it is not expected that more than X active QCL type D assumption(s) for any PDSCH and any CORESETs for a given BWP of a serving cell become active for the UE. The UE shall include this field.

Note the UE is required to track only the active TCI states.

The UE is mandated to report tci-StatePDSCH.</td><td>Band</td><td>Yes</td><td>N/A</td><td>N/A</td></tr>
<tr><td>twoPortsPTRS-UL
Defines whether UE supports PT-RS with 2 antenna ports for UL transmission.</td><td>Band</td><td>No</td><td>N/A</td><td>N/A</td></tr>
<tr><td>ue-PowerClass
For FR1, if the UE supports the different UE power class than the default UE power class as defined in clause 6.2 of TS 38.101-1 [2], the UE shall report the supported UE power class in this field. For FR2, UE shall report the supported UE power class as defined in clause 6 and 7 of TS 38.101-2 [3] in this field.</td><td>Band</td><td>Yes</td><td>N/A</td><td>N/A</td></tr>
<tr><td>uplinkBeamManagement
Defines support of beam management for UL. This capability signalling comprises the following parameters:
- maxNumberSRS-ResourcePerSet-BM indicates the maximum number of SRS resources per SRS resource set configurable for beam management, supported by the UE.

- maxNumberSRS-ResourceSet indicates the maximum number of SRS resource sets configurable for beam management, supported by the UE.

If the UE does not set beamCorrespondenceWithoutUL-BeamSweeping to supported, the UE shall report this capability. This feature is optional for the UE that supports beam correspondence without uplink beam sweeping as defined in clause 6.6, TS 38.101-2 [3].

NOTE: The network uses maxNumberSRS-ResourceSet to determine the maximum number of SRS resource sets that can be configured to the UE for periodic/semi-persistent/aperiodic configurations as below:

<table>
<tr><th>Maximum number of SRS resource sets across all time domain behaviour (periodic/semi-persistent/aperiodic) reported in maxNumberSRS-ResourceSet</th><th>Additional constraint on the maximum number of SRS resource sets configured to the UE for each supported time domain behaviour (periodic/semi-persistent/aperiodic)</th></tr>
<tr><td>1</td><td>1</td></tr>
<tr><td>2</td><td>1</td></tr>
<tr><td>3</td><td>1</td></tr>
<tr><td>4</td><td>2</td></tr>
<tr><td>5</td><td>2</td></tr>
<tr><td>6</td><td>2</td></tr>
<tr><td>7</td><td>4</td></tr>
<tr><td>8</td><td>4</td></tr>
</table></td><td>Band</td><td>No</td><td>N/A</td><td>FR2 only</td></tr>
</table>

4.2.7.3 *CA-ParametersEUTRA*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
additionalRx-Tx-PerformanceReq *additionalRx-Tx-PerformanceReq* defined in 4.3.5.22, TS 36.306 [15].	BC	No	N/A	N/A
dl-1024QAM-TotalWeightedLayers Indicates total number of weighted layers for the LTE part of the concerned (NG)EN-DC/NE-DC band combination the UE can process for 1024QAM, as described in TS 36.306 [15] equation 4.3.5.31-1. Actual value = (10 + indicated value x 2), i.e. value 0 indicates 10 layers, value 1 indicates 12 layers and so on. For an (NG)EN-DC/NE-DC band combination for which this field is not included, *dl-1024QAM-TotalWeightedLayers-r15* as described in TS 36.331 [17] applies, if included.	BC	No	N/A	N/A
multipleTimingAdvance *multipleTimingAdvance* defined in 4.3.5.3, TS 36.306 [15].	BC	No	N/A	N/A
simultaneousRx-Tx *simultaneousRx-Tx* defined in 4.3.5.4, TS 36.306 [15].	BC	No	N/A	N/A
supportedBandwidthCombinationSetEUTRA Indicates the set of supported bandwidth combinations for the LTE part for inter-band (NG)EN-DC without intra-band (NG)EN-DC component, inter-band NE-DC without intra-band NE-DC component and intra-band (NG)EN-DC/NE-DC with additional inter-band LTE CA component. The field is encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. The UE shall neither include the field for a (NG)EN-DC/NE-DC combination which has only one LTE carrier, nor for a (NG)EN-DC/NE-DC combination which has more than one LTE carrier for which the UE only supports Bandwidth Combination Set 0 for the LTE part. If the inter-band (NG)EN-DC/NE-DC has more than one LTE carrier, the UE shall support at least one bandwidth combination for the supported LTE part.	BC	CY	N/A	N/A
supportedNAICS-2CRS-AP *supportedNAICS-2CRS-AP* defined in 4.3.5.8, TS 36.306 [15].	BC	No	N/A	N/A
fd-MIMO-TotalWeightedLayers Indicates total number of weighted layers for the LTE part of the concerned (NG)EN-DC/NE-DC band combination the UE can process for FD-MIMO, as described in TS 36.306 [15] equation 4.3.28.13-1 and TS 36.331 [17] clause 6.3.6, NOTE 8 in *UE-EUTRA-Capability* field descriptions. For an (NG)EN-DC/NE-DC band combination for which this field is not included, *totalWeightedLayers-r13* as described in TS 36.331 [17] applies, if included.	BC	No	N/A	N/A
ue-CA-PowerClass-N *ue-CA-PowerClass-N* defined in 4.3.5.1.3, TS 36.306 [15].	BC	No	N/A	N/A

4.2.7.4 *CA-ParametersNR*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
csi-RS-IM-ReceptionForFeedbackPerBandComb Indicates support of CSI-RS and CSI-IM reception for CSI feedback. This capability signalling comprises the following parameters: - *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the maximum number of simultaneous CSI-RS resources in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. This parameter limits the total number of NZP-CSI-RS resources that the NW may configure across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type). The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> maxNumberSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> maxNumberSimultaneousNZP-CSI-RS-PerCC*; - *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the total number of CSI-RS ports in simultaneous CSI-RS resources in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. This parameter limits the total number of ports that the NW may configure across all NZP-CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type). The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC*. The UE is mandated to report *csi-RS-IM-ReceptionForFeedbackPerBandComb*.	BC	Yes	N/A	N/A
diffNumerologyAcrossPUCCH-Group Indicates whether different numerology across two NR PUCCH groups for data and control channel at a given time in NR CA and (NG)EN-DC/NE-DC is supported by the UE.	BC	No	N/A	N/A
diffNumerologyWithinPUCCH-GroupLargerSCS Indicates whether UE supports different numerology across carriers within a PUCCH group and a same numerology between DL and UL per carrier for data/control channel at a given time in NR CA, (NG)EN-DC/NE-DC and NR-DC. In case of NR CA and (NG)EN-DC/NE-DC with one NR PUCCH group and in case of NR CA with two NR PUCCH groups, it also indicates whether the UE supports different numerologies across NR carriers within the same NR PUCCH group up to two different numerologies within the same NR PUCCH group, wherein NR PUCCH is sent on the carrier with larger SCS for data and control channel at a given time. In case of (NG)EN-DC/NE-DC with two NR PUCCH groups, it indicates whether the UE supports different numerologies across NR carriers up to two different numerologies within an NR PUCCH group in FR1, wherein NR PUCCH is sent on the carrier with larger SCS, and same numerology across NR carriers within another NR PUCCH group in FR2 for data and control channel at a given time. In case of NR-DC, it indicates whether the UE supports different numerologies across NR carriers within the same NR PUCCH group in MCG (in FR1) up to two different numerologies within the same NR PUCCH group wherein NR PUCCH is sent on the carrier with larger SCS for data/control channel at a given time; and same numerology across NR carriers in SCG (in FR2).	BC	No	N/A	N/A

diffNumerologyWithinPUCCH-GroupSmallerSCS Indicates whether UE supports different numerology across carriers within a PUCCH group and a same numerology between DL and UL per carrier for data/control channel at a given time in NR CA, (NG)EN-DC/NE-DC and NR-DC. In case of NR CA and (NG)EN-DC/NE-DC with one NR PUCCH group and in case of NR CA with two NR PUCCH groups, it also indicates whether the UE supports different numerologies across NR carriers within the same NR PUCCH group up to two different numerologies within the same NR PUCCH group, wherein NR PUCCH is sent on the carrier with smaller SCS for data and control channel at a given time. In case of (NG)EN-DC/NE-DC with two NR PUCCH groups, it indicates whether the UE supports different numerologies across NR carriers up to two different numerologies within an NR PUCCH group in FR1, wherein NR PUCCH is sent on the carrier with smaller SCS, and same numerology across NR carriers within another NR PUCCH group in FR2 for data and control channel at a given time. In case of NR-DC, it indicates whether the UE supports different numerologies across NR carriers within the same NR PUCCH group in MCG (in FR1) up to two different numerologies within the same NR PUCCH group wherein NR PUCCH is sent on the carrier with smaller SCS for data/control channel at a given time; and same numerology across NR carriers in SCG (in FR2).	BC	No	N/A	N/A
dualPA-Architecture For band combinations with single-band with UL CA, this field indicates the support of dual PA. If absent in such band combinations, the UE supports single PA for all the ULs. For other band combinations, this field is not applicable.	BC	No	N/A	N/A
parallelTxSRS-PUCCH-PUSCH Indicates whether the UE supports parallel transmission of SRS and PUCCH/ PUSCH across CCs in an inter-band CA band combination.	BC	No	N/A	N/A
parallelTxPRACH-SRS-PUCCH-PUSCH Indicates whether the UE supports parallel transmission of PRACH and SRS/PUCCH/PUSCH across CCs in an inter-band CA band combination.	BC	No	N/A	N/A
simultaneousCSI-ReportsAllCC Indicates whether the UE supports CSI report framework and the number of CSI report(s) which the UE can simultaneously process across all CCs, and across MCG and SCG in case of NR-DC. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in *simultaneousCSI-ReportsAllCC* includes the beam report and CSI report. This parameter may further limit *simultaneousCSI-ReportsPerCC* in *MIMO-ParametersPerBand* and *Phy-ParametersFRX-Diff* for each band in a given band combination.	BC	Yes	N/A	N/A
simultaneousRxTxInterBandCA Indicates whether the UE supports simultaneous transmission and reception in TDD-TDD and TDD-FDD inter-band NR CA. It is mandatory for certain TDD-FDD and TDD-TDD band combinations defined in TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4].	BC	CY	N/A	N/A
simultaneousRxTxSUL Indicates whether the UE supports simultaneous reception and transmission for a NR band combination including SUL. Mandatory/Optional support depends on band combination and captured in TS 38.101-1 [2].	BC	CY	N/A	N/A
simultaneousSRS-AssocCSI-RS-AllCC Indicates support of CSI-RS processing framework for SRS and the number of SRS resources that the UE can process simultaneously across all CCs, and across MCG and SCG in case of NR-DC, including periodic, aperiodic and semi-persistent SRS. This parameter may further limit *simultaneousSRS-AssocCSI-RS-PerCC* in *MIMO-ParametersPerBand* and *Phy-ParametersFRX-Diff* for each band in a given band combination.	BC	No	N/A	N/A
supportedNumberTAG Defines the number of timing advance groups supported by the UE. It is applied to NR CA, NR-DC and (NG)EN-DC/NE-DC. For (NG)EN-DC/NE-DC, it indicates number of TAGs only for NR CG. The number of TAGs for the LTE MCG is signalled by existing LTE TAG capability signalling. For NR CA/NR-DC band combination, if the band combination comprised of more than one band entry (i.e., inter-band or intra-band non-contiguous band combination), it indicates that different timing advances on different band entries are supported. If absent, the UE supports only one TAG for the NR part. It is mandatory for the UE to support more than one TAG for NR-DC.	BC	CY	N/A	N/A

4.2.7.5 *FeatureSetDownlink* parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
additionalDMRS-DL-Alt Indicates whether the UE supports the alternative additional DMRS position for co-existence with LTE CRS. It is applied to 15kHz SCS and one additional DMRS case only.	FS	No	N/A	FR1 only
csi-RS-MeasSCellWithoutSSB Defines whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS 38.215 [13], where CSI-RS resource is configured for a cell that does not transmit SS/PBCH block. A UE that supports this feature shall also support scellWithoutSSB.	FS	No	N/A	N/A
dl-MCS-TableAlt-DynamicIndication Indicates whether the UE supports dynamic indication of MCS table for PDSCH.	FS	No	N/A	N/A
featureSetListPerDownlinkCC Indicates which features the UE supports on the individual DL carriers of the feature set (and hence of a band entry that refer to the feature set) by *FeatureSetDownlinkPerCC-Id*. The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetDownlinkPerCC-Id* in this list. A fallback per CC feature set resulting from the reported feature set per DL CC is not signalled but the UE shall support it.	FS	N/A	N/A	N/A
intraBandFreqSeparationDL Indicates DL frequency separation class the UE supports, which indicates a maximum frequency separation between lower edge of lowest CC and upper edge of highest CC in a frequency band, for intra-band non-contiguous CA. The UE sets the same value in the FeatureSetDownlink of each band entry within a band. The values c1, c2 and c3 correspond to the values defined in TS 38.101-2 [3]. It is mandatory to report for UE which supports DL intra-band non-contiguous CA in FR2.	FS	CY	N/A	FR2 only
oneFL-DMRS-ThreeAdditionalDMRS-DL Defines whether the UE supports DM-RS pattern for DL transmission with 1 symbol front-loaded DM-RS with three additional DM-RS symbols.	FS	No	N/A	N/A
oneFL-DMRS-TwoAdditionalDMRS-DL Defines support of DM-RS pattern for DL transmission with 1 symbol front-loaded DM-RS with 2 additional DM-RS symbols and more than 1 antenna ports.	FS	Yes	N/A	N/A
pdcch-MonitoringAnyOccasions Defines the supported PDCCH search space monitoring occasions. withoutDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot for Type 1-PDCCH common search space configured by dedicated RRC signaling, for a Type 3-PDCCH common search space, or for a UE-specific search space with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively. withDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation of two OFDM symbols for 15 kHz, four OFDM symbols for 30 kHz, seven OFDM symbols for 60 kHz with NCP, and 14OFDM symbols for 120kHz between two consecutive transmissions of PDCCH scrambled with C-RNTI, MCS-C-RNTI, or CS-RNTI for Type 1-PDCCH common search space configured by dedicated RRC signaling, for a Type 3-PDCCH common search space, or for a UE-specific search space, with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively.	FS	No	N/A	N/A
pdcch-MonitoringAnyOccasionsWithSpanGap Indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation between two consecutive transmissions of PDCCH with span up to two OFDM symbols for two OFDM symbols or span up to three OFDM symbols for four and seven OFDM symbols. Value set1 indicates the supported value set (X,Y) is (7,3), value set2 indicates the supported value set (X,Y) is (4,3) and (7,3) and value set 3 indicates the supported value set (X,Y) is (2,2), (4,3) and (7,3).	FS	No	N/A	N/A
pdsch-ProcessingType1-DifferentTB-PerSlot Defines whether the UE capable of processing time capability 1 supports reception of up to two, four or seven unicast PDSCHs for several transport blocks with PDSCH scrambled using C-RNTI, TC-RNTI, or CS-RNTI in one serving cell within the same slot per CC that are multiplexed in time domain only. Note PDSCH(s) for Msg.4 is included.	FS	No	N/A	N/A

pdsch-ProcessingType2 Indicates whether the UE supports PDSCH processing capability 2. The UE supports it only if all serving cells are self-scheduled and if all serving cells in one band on which the network configured processingType2 use the same subcarrier spacing. This capability signalling comprises the following parameters for each sub-carrier spacing supported by the UE. - *fallback* indicates whether the UE supports PDSCH processing capability 2 when the number of configured carriers is larger than *numberOfCarriers* for a reported value of *differentTB-PerSlot*. If *fallback* = 'sc', UE supports capability 2 processing time on lowest cell index among the configured carriers in the band where the value is reported, if *fallback* = 'cap1-only', UE supports only capability 1, in the band where the value is reported; - *differentTB-PerSlot* indicates whether the UE supports processing type 2 for 1, 2, 4 and/or 7 unicast PDSCHs for different transport blocks per slot per CC; and if so, it indicates up to which number of CA serving cells the UE supports that number of unicast PDSCHs for different TBs. The UE shall include at least one of *numberOfCarriers* for 1, 2, 4 or 7 transport blocks per slot in this field if *pdsch-ProcessingType2* is indicated.	FS	No	N/A	FR1 only
pdsch-ProcessingType2-Limited Indicates whether the UE supports PDSCH processing capability 2 with scheduling limitation for SCS 30kHz. This capability signalling comprises the following parameter. - *differentTB-PerSlot-SCS-30kHz* indicates the number of different TBs per slot. The UE supports this limited processing capability 2 only if: 1) One carrier is configured in the band, independent of the number of carriers configured in the other bands; 2) The maximum bandwidth of PDSCH is 136 PRBs; 3) N1 based on Table 5.3-2 of TS 38.214 [12] for SCS 30 kHz.	FS	No	N/A	FR1 only
pdsch-SeparationWithGap Indicates whether the UE supports separation of two unicast PDSCHs with a gap, applicable to Sub-carrier spacings of 30 kHz and 60 kHz only. For any two consecutive slots n and n+1, if there are more than 1 unicast PDSCH in either slot, the minimum time separation between starting time of any two unicast PDSCHs within the duration of these slots is 4 OFDM symbols for 30kHz and 7 OFDM symbols for 60kHz.	FS	No	N/A	N/A
scalingFactor Indicates the scaling factor to be applied to the band in the max data rate calculation as defined in 4.1.2. Value f0p4 indicates the scaling factor 0.4, f0p75 indicates 0.75, and so on. If absent, the scaling factor 1 is applied to the band in the max data rate calculation.	FS	No	N/A	N/A
scellWithoutSSB Defines whether the UE supports configuration of SCell that does not transmit SS/PBCH block. This is conditionally mandatory with capability signalling for intra-band CA but not supported for inter-band CA.	FS	CY	N/A	N/A
searchSpaceSharingCA-DL Defines whether the UE supports DL PDCCH search space sharing for carrier aggregation operation.	FS	No	N/A	N/A

supportedSRS-Resources Defines support of SRS resources for SRS carrier switching for a band without associated FeatureSetuplink. The capability signalling comprising indication of: - *maxNumberAperiodicSRS-PerBWP* indicates supported maximum number of aperiodic SRS resources that can be configured for the UE per each BWP - *maxNumberAperiodicSRS-PerBWP-PerSlot* indicates supported maximum number of aperiodic SRS resources per slot in the BWP - *maxNumberPeriodicSRS-PerBWP* indicates supported maximum number of periodic SRS resources per BWP - *maxNumberPeriodicSRS-PerBWP-PerSlot* indicates supported maximum number of periodic SRS resources per slot in the BWP - *maxNumberSemiPersistentSRS-PerBWP* indicate supported maximum number of semi-persistent SRS resources that can be configured for the UE per each BWP - *maxNumberSemiPersistentSRS-PerBWP-PerSlot* indicates supported maximum number of semi-persistent SRS resources per slot in the BWP - *maxNumberSRS-Ports-PerResource* indicates supported maximum number of SRS antenna port per each SRS resource If the UE indicates the support of srs-CarrierSwitch for this band and this field is absent, the UE suports one periodic, one aperiodic, no semi-persistent SRS resources per BWP per slot and one SRS antenna port per SRS resource.	FS	FD	N/A	N/A
timeDurationForQCL Defines minimum number of OFDM symbols required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [12] clause 5.1.5. UE shall indicate one value of the minimum number of OFDM symbols per each subcarrier spacing of 60kHz and 120kHz.	FS	Yes	N/A	FR2 only
twoFL-DMRS-TwoAdditionalDMRS-DL Defines whether the UE supports DM-RS pattern for DL transmission with 2 symbols front-loaded DM-RS with one additional 2 symbols DM-RS.	FS	No	N/A	N/A
type1-3-CSS Defines whether the UE is able to receive PDCCH in FR2 in a Type1-PDCCH common search space configured by dedicated RRC signaling, in a Type3-PDCCH common search space or a UE-specific search space if those are associated with a CORESET with a duration of 3 symbols.	FS	Yes	N/A	FR2 only
ue-SpecificUL-DL-Assignment Indicates whether the UE supports dynamic determination of UL and DL link direction and slot format based on Layer 1 scheduling DCI and higher layer configured parameter *TDD-UL-DL-ConfigDedicated* as specified in TS 38.213 [11].	FS	No	N/A	N/A

4.2.7.6 *FeatureSetDownlinkPerCC* parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
channelBW-90mhz Indicates whether the UE supports the channel bandwidth of 90 MHz.	FSPC	No	N/A	FR1 only
maxNumberMIMO-LayersPDSCH Defines the maximum number of spatial multiplexing layer(s) supported by the UE for DL reception. For single CC standalone NR, it is mandatory with capability signaling to support at least 4 MIMO layers in the bands where 4Rx is specified as mandatory for the given UE and at least 2 MIMO layers in FR2. If absent, the UE does not support MIMO on this carrier.	FSPC	CY	N/A	N/A
supportedBandwidthDL Indicates maximum DL channel bandwidth supported for a given SCS that UE supports within a single CC, which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2. For FR1, all the bandwidths listed in TS38.101-1 Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. For FR2, the set of mandatory CBW is 50, 100, 200 MHz. When this field is included in a band combination with a single band entry and a single CC entry (i.e. non-CA band combination), the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3]. NOTE: To determine whether the UE supports a channel bandwidth of 90 MHz, the network may ignore this capability for and validate instead the *channelBW-90mhz* and the *supportedBandwidthCombinationSet*. For serving cells with other channel bandwidths the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet* and *supportedBandwidthDL*.	FSPC	CY	N/A	N/A
supportedModulationOrderDL Indicates the maximum supported modulation order to be applied for downlink in the carrier in the max data rate calculation as defined in 4.1.2. If included, the network may use a modulation order on this serving cell which is higher than the value indicated in this field as long as UE supports the modulation of higher value for downlink. If not included: - for FR1, the network uses the modulation order signalled in *pdsch-256QAM-FR1.* - for FR2, the network uses the modulation order signalled per band i.e. *pdsch-256QAM-FR2* if signalled. If not signalled in a given band, the network shall use the modulation order 64QAM. In all the cases, it shall be ensured that the data rate does not exceed the max data rate (*DataRate*) and max data rate per CC (*DataRateCC*) according to TS 38.214 [12].	FSPC	No	N/A	N/A
supportedSubCarrierSpacingDL Defines the supported sub-carrier spacing for DL by the UE, as defined in clause 4.2-1 of TS 38.211 [6], indicating the UE supports simultaneous reception with same or different numerologies in CA. Support of simultaneous reception with same numerology for intra-band NR CA including both contiguous and non-contiguous is mandatory with capability in both FR1 and FR2. Support of simultaneous reception with two different numerologies between FR1 band(s) and FR2 band(s) in DL is mandatory with capability if UE supports inter-band NR CA including both FR1 band(s) and FR2 band(s). Optional for other cases. Support of simultaneous reception of with different numerologies in CA for other cases is optional.	FSPC	CY	N/A	N/A

4.2.7.7 *FeatureSetUplink* parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
scalingFactor Indicates the scaling factor to be applied to the band in the max data rate calculation as defined in 4.1.2. Value f0p4 indicates the scaling factor 0.4, f0p75 indicates 0.75, and so on. If absent, the scaling factor 1 is applied to the band in the max data rate calculation.	FS	No	N/A	N/A
dynamicSwitchSUL Indicates whether the UE supports supplemental uplink with dynamic switch (DCI based selection of PUSCH carrier). The UE supports this among a carrier on a band X and a band Y if it sets this capability parameter for both band X and band Y.	FS	No	N/A	N/A
featureSetListPerUplinkCC Indicates which features the UE supports on the individual UL carriers of the feature set (and hence of a band entry that refer to the feature set) by *FeatureSetUplinkPerCC-Id*. The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetUplinkPerCC-Id* in this list. A fallback per CC feature set resulting from the reported feature set per UL CC is not signalled but the UE shall support it.	FS	N/A	N/A	N/A
intraBandFreqSeparationUL Indicates UL frequency separation class the UE supports, which indicates a maximum frequency separation between lower edge of lowest CC and upper edge of highest CC in a frequency band, for intra-band non-contiguous CA. The UE sets the same value in the FeatureSetUplink of each band entry within a band. The values c1, c2 and c3 corresponds to the values defined in TS 38.101-2 [3]. It is mandatory to report for UE which supports UL non-contiguous CA in FR2.	FS	CY	N/A	FR2 only
pa-PhaseDiscontinuityImpacts Indicates incapability motivated by impacts of PA phase discontinuity with overlapping transmissions with non-aligned starting or ending times or hop boundaries across carriers for intra-band (NG)EN-DC/NE-DC, intra-band CA and FDM based ULSUP.	FS	No	N/A	N/A
pusch-ProcessingType1-DifferentTB-PerSlot Indicates whether the UE capable of processing time capability 1 supports transmission of up to two, four or seven unicast PUSCHs for several transport blocks in one serving cell within the same slot per CC that are multiplexed in time domain only.	FS	No	N/A	N/A
pusch-ProcessingType2 Indicates whether the UE supports PUSCH processing capability 2. The UE supports it only if all serving cells are self-scheduled and if all serving cells in one band on which the network configured processingType2 use the same subcarrier spacing. This capability signalling comprises the following parameters for each sub-carrier spacing supported by the UE. - *fallback* indicates whether the UE supports PUSCH processing capability 2 when the number of configured carriers is larger than *numberOfCarriers* for a reported value of *differentTB-PerSlot*. If *fallback* = 'sc', UE supports capability 2 processing time on lowest cell index among the configured carriers in the band where the value is reported, if *fallback* = 'cap1-only', UE supports only capability 1, in the band where the value is reported; - *differentTB-PerSlot* indicates whether the UE supports processing type 2 for 1, 2, 4 and/or 7 unicast PUSCHs for different transport blocks per slot per CC; and if so, it indicates up to which number of CA serving cells the UE supports that number of unicast PUSCHs for different TBs. The UE shall include at least one of *numberOfCarriers* for 1, 2, 4 or 7 transport blocks per slot in this field if *pusch-ProcessingType2* is indicated.	FS	No	N/A	FR1 only
pusch-SeparationWithGap Indicates whether the UE supports separation of two unicast PUSCHs with a gap, applicable to Sub-carrier spacings of 15 kHz, 30 kHz and 60 kHz only. For any two consecutive slots n and n+1, if there are more than 1 unicast PUSCH in either slot, the minimum time separation between starting time of any two unicast PUSCHs within the duration of these slots is 2 OFDM symbols for 15kHz, 4 OFDM symbols for 30kHz and 7 OFDM symbols for 60kHz.	FS	No	N/A	N/A
searchSpaceSharingCA-UL Defines whether the UE supports UL PDCCH search space sharing for carrier aggregation operation.	FS	No	N/A	N/A

simultaneousTxSUL-NonSUL Indicates whether the UE supports simultaneous transmission of SRS on an SUL/non-SUL carrier and PUSCH/PUCCH/SRS on the other UL carrier in the same cell. The UE supports simultaneous transmission on an SUL band X and a Non-SUL band Y if it sets this capability parameter for both band X and band Y.	FS	No	N/A	N/A
supportedSRS-Resources Defines support of SRS resources. The capability signalling comprising indication of: - *maxNumberAperiodicSRS-PerBWP* indicates supported maximum number of aperiodic SRS resources that can be configured for the UE per each BWP - *maxNumberAperiodicSRS-PerBWP-PerSlot* indicates supported maximum number of aperiodic SRS resources per slot in the BWP - *maxNumberPeriodicSRS-PerBWP* indicates supported maximum number of periodic SRS resources per BWP - *maxNumberPeriodicSRS-PerBWP-PerSlot* indicates supported maximum number of periodic SRS resources per slot in the BWP - *maxNumberSemiPersistentSRS-PerBWP* indicate supported maximum number of semi-persistent SRS resources that can be configured for the UE per each BWP - *maxNumberSemiPersistentSRS-PerBWP-PerSlot* indicates supported maximum number of semi-persistent SRS resources per slot in the BWP - *maxNumberSRS-Ports-PerResource* indicates supported maximum number of SRS antenna port per each SRS resource If this field is not included, the UE suports one periodic, one aperiodic, no semi-persistent SRS resources per BWP and one periodic, one aperiodic, no semi-persistent SRS resources per BWP per slot and one SRS antenna port per SRS resource.	FS	FD	N/A	N/A
twoPUCCH-Group Indicates whether two PUCCH group in CA with a same numerology across CCs for data and control channel [at a given time] is supported by the UE. For NR CA, two PUCCH group is supported with the same numerology across NR carriers for data and control channel at a given time. For (NG)EN-DC/NE-DC, two PUCCH group is supported with the same numerology across NR carriers for data and control channel at a given time, wherein an NR PUCCH group is configured in FR1 and another NR PUCCH group is configured in FR2. The UE supports two PUCCH groups with PUCCH on a band X and a band Y if it sets this capability parameter for both band X and band Y.	FS	No	N/A	N/A
ul-MCS-TableAlt-DynamicIndication Indicates whether the UE supports dynamic indication of MCS table using MCS-C-RNTI for PUSCH.	FS	No	N/A	N/A
zeroSlotOffsetAperiodicSRS Indicates whether the UE supports 0 slot offset between aperiodic SRS triggering and transmission, for SRS for CB PUSCH and antenna switching on FR1.	FS	No	N/A	N/A

4.2.7.8 *FeatureSetUplinkPerCC* parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
channelBW-90mhz Indicates whether the UE supports the channel bandwidth of 90 MHz.	FSPC	No	N/A	FR1 only
maxNumberMIMO-LayersCB-PUSCH Defines supported maximum number of MIMO layers at the UE for PUSCH transmission with codebook precoding. UE indicating support of this feature shall also indicate support of PUSCH codebook coherency subset. This feature is not supported for SUL.	FSPC	No	N/A	N/A
maxNumberMIMO-LayersNonCB-PUSCH Defines supported maximum number of MIMO layers at the UE for PUSCH transmission using non-codebook precoding. This feature is not supported for SUL. UE supporting non-codebook based PUSCH transmission shall indicate support of *maxNumberMIMO-LayersNonCB-PUSCH, maxNumberSRS-ResourcePerSet* and *maxNumberSimultaneousSRS-ResourceTx* together.	FSPC	No	N/A	N/A
maxNumberSimultaneousSRS-ResourceTx Defines the maximum number of simultaneous transmitted SRS resources at one symbol for non-codebook based transmission to the UE. This feature is not supported for SUL.	FSPC	No	N/A	N/A
maxNumberSRS-ResourcePerSet Defines the maximum number of SRS resources per SRS resource set configured for codebook or non-codebook based transmission to the UE. This feature is not supported for SUL.	FSPC	No	N/A	N/A
supportedBandwidthUL Indicates maximum UL channel bandwidth supported for a given SCS that UE supports within a single CC, which is defined in Table 5.3.5-1 in TS38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2. For FR1, all the bandwidths listed in TS38.101-1 Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. For FR2, the set of mandatory CBW is 50, 100, 200 MHz. When this field is included in a band combination with a single band entry and a single CC entry (i.e. non-CA band combination), the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3]. NOTE: To determine whether the UE supports a channel bandwidth of 90 MHz the network may ignore this capability for and validate instead the *channelBW-90mhz* and the *supportedBandwidthCombiantionSet*. For serving cells with other channel bandwidths the network validates the *channelBWs-UL*, the *supportedBandwidthCombinationSet* and *supportedBandwidthUL*.	FSPC	CY	N/A	N/A
supportedModulationOrderUL Indicates the maximum supported modulation order to be applied for uplink in the carrier in the max data rate calculation as defined in 4.1.2. If included, the network may use a modulation order on this serving cell which is higher than the value indicated in this field as long as UE supports the modulation of higher value for uplink. If not included, - for FR1 and FR2, the network uses the modulation order signalled per band i.e. *pusch-256QAM* if signalled. If not signalled in a given band, the network shall use the modulation order 64QAM. In all the cases, it shall be ensured that the data rate does not exceed the max data rate (*DataRate*) and max data rate per CC (*DataRateCC*) according to TS 38.214 [12].	FSPC	No	N/A	N/A
supportedSubCarrierSpacingUL Defines the supported sub-carrier spacing for UL by the UE, as defined in 4.2-1 of TS 38.211 [6], indicating the UE supports simultaneous transmission with same or different numerologies in CA, or indicating the UE supports different numerologies on NR UL and SUL within one cell. Support of simultaneous transmissions with same numerology for intra-band NR CA including both contiguous and non-contiguous is mandatory with capability in both FR1 and FR2. Support of simultaneous transmission with two different numerologies between FR1 band(s) and FR2 band(s) in UL is mandatory with capability if UE supports inter-band NR CA including both FR1 band(s) and FR2 band(s). Support of simultaneous transmission with different numerologies in CA for other cases is optional.	FSPC	CY	N/A	N/A

4.2.7.9 *MRDC-Parameters*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
asyncIntraBandENDC Indicates whether the UE supports asynchronous FDD-FDD intra-band (NG)EN-DC with MRTD and MTTD as specified in clause 7.5 and 7.6 of TS 38.133 [5]. If asynchronous FDD-FDD intra-band (NG)EN-DC is not supported, the UE supports only synchronous FDD-FDD intra-band (NG)EN-DC.	BC	No	FDD only	FR1 only
dualPA-Architecture For an intra-band band combination, this field indicates the support of dual PAs. If absent in an intra-band band combination, the UE supports single PA for all the ULs in the intra-band band combination. For other band combinations, this field is not applicable.	BC	No	N/A	N/A
dynamicPowerSharingENDC Indicates whether the UE supports dynamic (NG)EN-DC power sharing between NR FR1 carriers and the LTE carriers. If the UE supports this capability the UE supports the dynamic power sharing behaviour as specified in clause 7 of TS 38.213 [11].	BC	Yes	N/A	FR1 only
dynamicPowerSharingNEDC Indicates whether the UE supports dynamic NE-DC power sharing between NR FR1 carriers and the LTE carriers. If the UE supports this capability, the UE supports the dynamic power sharing behavior as specified in clause 7 of TS 38.213 [11].	BC	Yes	N/A	FR1 only
intraBandENDC-Support Indicates whether the UE supports intra-band (NG)EN-DC with only non-contiguous spectrum, or with both contiguous and non-contiguous spectrum for the (NG)EN-DC combination as specified in TS 38.101-3 [4]. If the UE does not include this field for an intra-band (NG)EN-DC combination the UE only supports the contiguous spectrum for the intra-band (NG)EN-DC combination.	BC	No	N/A	N/A
interBandContiguousMRDC Indicates for an inter-band (NG)EN-DC/NE-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]), that the UE supports intra-band contiguous (NG)EN-DC/NE-DC requirements (see TS 38.101-3 [4]). If the field is absent for such an inter-band (NG)EN-DC/NE-DC combination, the UE supports intra-band non-contiguous (NG)EN-DC/NE-DC requirements.	BC	CY	N/A	N/A
simultaneousRxTxInterBandENDC Indicates whether the UE supports simultaneous transmission and reception in TDD-TDD and TDD-FDD inter-band (NG)EN-DC/NE-DC. It is mandatory for certain TDD-FDD and TDD-TDD band combinations defined in TS 38.101-3 [4].	BC	CY	N/A	N/A
singleUL-Transmission Indicates that the UE does not support simultaneous UL transmissions as defined in TS 38.101-3 [4]. The UE may only include this field for certain band combinations defined in TS 38.101-3 [4]. If included for a particular band combination, the field applies to all fallback band combinations of this band combination that are defined in TS 38.101-3 [4] as being allowed to include this field and does not apply to any other fallback band combinations defined in TS 38.101-3 [4].	BC	No	N/A	N/A
spCellPlacement Indicates whether the UE supports a SpCell on FR1-FDD, FR1-TDD and/or FR2-TDD depending on which additional SCells of other frequency range(s) / duplex mode(s) are configured. It is applicable to SCG of (NG)EN-DC and MCG of NE-DC, where UL is configured on more than one of FR1-FDD, FR1-TDD and FR2-TDD in a cell group. If not included, the UE supports SpCell on any serving cell with UL in supported band combinations.	UE	No	N/A	N/A
tdm-Pattern Indicates whether the UE supports the *tdm-PatternConfig* for *single UL-transmission* associated functionality, as specified in TS 36.331 [17]. Support is conditionally mandatory in (NG)EN-DC for UEs that do not support dynamicPowerSharingENDC and for UEs that indicate single UL transmission for any (NG)EN-DC BC. Support is conditionally mandatory in NE-DC for UEs that do not support dynamicPowerSharingNEDC and for UEs that indicate single UL transmission for any NE-DC BC. The feature is optional otherwise.	BC	CY	N/A	FR1 only
ul-SharingEUTRA-NR Indicates whether the UE supports (NG)EN-DC/NE-DC with EUTRA-NR coexistence in UL sharing via TDM only, FDM only, or both TDM and FDM from UE perspective as specified in TS 38.101-3 [4].	BC	No	N/A	FR1 only

ul-SwitchingTimeEUTRA-NR Indicates support of switching type between LTE UL and NR UL for (NG)EN-DC/NE-DC with LTE-NR coexistence in UL sharing from UE perspective as defined in clause 6.3B of TS 38.101-3 [4]. It is mandatory to report switching time type 1 or type 2 if UE reports *ul-SharingEUTRA-NR* is *tdm* or *both*.	BC	CY	N/A	FR1 only
ul-TimingAlignmentEUTRA-NR Indicates whether to apply the same UL timing between NR and LTE for dynamic power sharing capable UE operating in a synchronous intra-band contiguous (NG)EN-DC. If this field is absent, UE shall be capable of handling a timing difference up to applicable MTTD requirements when operating in a synchronous intra-band contiguous (NG)EN-DC network, as specified in TS 38.133 [5]. If this capability is included in an inter-band (NG)EN-DC BC with an intra-band (NG)EN-DC BC part, this capability is used to indicate the restriction to the intra-band (NG)EN-DC BC part.	BC	No	N/A	N/A

4.2.7.10 *Phy-Parameters*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
absoluteTPC-Command Indicates whether the UE supports absolute TPC command mode.	UE	No	No	Yes
almostContiguousCP-OFDM-UL Indicates whether the UE supports almost contiguous UL CP-OFDM transmissions as defined in clause 6.2 of TS 38.101-1 [2].	UE	No	No	Yes
bwp-SwitchingDelay Defines whether the UE supports DCI and timer based active BWP switching delay type1 or type2 specified in clause 8.6.2 of TS 38.133 [5]. It is mandatory to report type 1 or type 2.	UE	Yes	No	No
cbg-FlushIndication-DL Indicates whether the UE supports CBG-based (re)transmission for DL using CBG flushing out information (CBGFI) as specified in TS 38.214 [12].	UE	No	No	No
cbg-TransIndication-DL Indicates whether the UE supports CBG-based (re)transmission for DL using CBG transmission information (CBGTI) as specified in TS 38.214 [12].	UE	No	No	No
cbg-TransIndication-UL Indicates whether the UE supports CBG-based (re)transmission for UL using CBG transmission information (CBGTI) as specified in TS 38.214 [12].	UE	No	No	No
configuredUL-GrantType1 Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one.	UE	No	No	No
configuredUL-GrantType2 Indicates whether the UE supports Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one.	UE	No	No	No
cqi-TableAlt Indicates whether UE supports the CQI table with target BLER of 10^-5.	UE	No	No	Yes
csi-ReportFramework See *csi-ReportFramework* in 4.2.7.2. For a band combination comprised of FR1 and FR2 bands, this parameter, if present, limits the corresponding parameter in *MIMO-ParametersPerBand*.	UE	Yes	No	N/A
csi-ReportWithoutCQI Indicates whether UE supports CSI reporting with report quantity set to 'CRI/RI/i1' as defined in clause 5.2.1.4 of TS 38.214 [12].	UE	No	No	Yes
csi-ReportWithoutPMI Indicates whether UE supports CSI reporting with report quantity set to 'CRI/RI/CQI' as defined in clause 5.2.1.4 of TS 38.214 [12].	UE	No	No	Yes
csi-RS-CFRA-ForHO Indicates whether the UE can perform reconfiguration with sync using a contention free random access on PRACH resources that are associated with CSI-RS resources of the target cell.	UE	No	No	No
csi-RS-IM-ReceptionForFeedback See *csi-RS-IM-ReceptionForFeedback* in 4.2.7.2. For a band combination comprised of FR1 and FR2 bands, this parameter, if present, limits the corresponding parameter in *MIMO-ParametersPerBand*.	UE	Yes	No	N/A
csi-RS-ProcFrameworkForSRS See *csi-RS-ProcFrameworkForSRS* in 4.2.7.2. For a band combination comprised of FR1 and FR2 bands, this parameter, if present, limits the corresponding parameter in *MIMO-ParametersPerBand*.	UE	No	No	N/A
dl-64QAM-MCS-TableAlt Indicates whether the UE supports the alternative 64QAM MCS table for PDSCH.	UE	No	No	Yes
dl-SchedulingOffset-PDSCH-TypeA Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A.	UE	Yes	Yes	Yes
dl-SchedulingOffset-PDSCH-TypeB Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B.	UE	Yes	Yes	Yes
downlinkSPS Indicates whether the UE supports PDSCH reception based on semi-persistent scheduling.	UE	No	No	No
dynamicBetaOffsetInd-HARQ-ACK-CSI Indicates whether the UE supports indicating beta-offset (UCI repetition factor onto PUSCH) for HARQ-ACK and/or CSI via DCI among the RRC configured beta-offsets.	UE	No	No	No

dynamicHARQ-ACK-Codebook Indicates whether the UE supports HARQ-ACK codebook dynamically constructed by DCI(s). This field shall be set to *supported*.	UE	Yes	No	No
dynamicHARQ-ACK-CodeB-CBG-Retx-DL Indicates whether the UE supports HARQ-ACK codebook size for CBG-based (re)transmission based on the DAI-based solution as specified in TS 38.213 [11].	UE	No	No	No
dynamicPRB-BundlingDL Indicates whether UE supports DCI-based indication of the PRG size for PDSCH reception.	UE	No	No	No
dynamicSFI Indicates whether the UE supports monitoring for DCI format 2_0 and determination of slot formats via DCI format 2_0.	UE	No	Yes	Yes
dynamicSwitchRA-Type0-1-PDSCH Indicates whether the UE supports dynamic switching between resource allocation Types 0 and 1 for PDSCH as specified in TS 38.212 [10].	UE	No	No	No
dynamicSwitchRA-Type0-1-PUSCH Indicates whether the UE supports dynamic switching between resource allocation Types 0 and 1 for PUSCH as specified in TS 38.212 [10].	UE	No	No	No
pucch-F0-2WithoutFH Indicates whether the UE supports transmission of a PUCCH format 0 or 2 without frequency hopping. When included, the UE does not support PUCCH formats 0 and 2 without frequency hopping. When not included, the UE supports the PUCCH formats 0 and 2 without frequency hopping.	UE	Yes	No	Yes
pucch-F1-3-4WithoutFH Indicates whether the UE supports transmission of a PUCCH format 1, 3 or 4 without frequency hopping. When included, the UE does not support PUCCH formats 1, 3 and 4 without frequency hopping. When not included, the UE supports the PUCCH formats 1, 3 and 4 without frequency hopping.	UE	Yes	No	Yes
interleavingVRB-ToPRB-PDSCH Indicates whether the UE supports receiving PDSCH with interleaved VRB-to-PRB mapping as specified in TS 38.211 [6].	UE	Yes	No	No
interSlotFreqHopping-PUSCH Indicates whether the UE supports inter-slot frequency hopping for PUSCH transmissions.	UE	No	No	No
intraSlotFreqHopping-PUSCH Indicates whether the UE supports intra-slot frequency hopping for PUSCH transmission, except for PUSCH scheduled by PDCCH in the Type1-PDCCH common search space before RRC connection establishment.	UE	Yes	No	Yes
maxLayersMIMO-Indication Indicates whether the UE supports the network configuration of *maxMIMO-Layers* as specified in TS 38.331 [9].	UE	Yes	No	No
maxNumberSearchSpaces Indicates whether the UE supports up to 10 search spaces in an SCell per BWP.	UE	No	No	No
multipleCORESET Indicates whether the UE supports configuration of up to two PDCCH CORESETs per BWP in addition to the CORESET with CORESET-ID 0 in the BWP. If this is not supported, the UE supports one PDCCH CORESET per BWP in addition to the CORESET with CORESET-ID 0 in the BWP. It is mandatory with capability signaling for FR2 and optional for FR1.	UE	CY	No	Yes
mux-HARQ-ACK-PUSCH-DiffSymbol Indicates whether the UE supports HARQ-ACK piggyback on a PUSCH with/without aperiodic CSI once per slot when the starting OFDM symbol of the PUSCH is different from the starting OFDM symbols of the PUCCH resource that HARQ-ACK would have been transmitted on.	UE	Yes	No	Yes
mux-MultipleGroupCtrlCH-Overlap Indicates whether the UE supports more than one group of overlapping PUCCHs and PUSCHs per slot per PUCCH cell group for control multiplexing.	UE	No	No	Yes
mux-SR-HARQ-ACK-CSI-PUCCH-MultiPerSlot Indicates whether the UE supports multiplexing SR, HARQ-ACK and CSI on a PUCCH or piggybacking on a PUSCH more than once per slot when SR, HARQ-ACK and CSI are supposed to be sent with the same or different starting symbol in a slot.	UE	No	No	Yes

mux-SR-HARQ-ACK-CSI-PUCCH-OncePerSlot *sameSymbol* indicates the UE supports multiplexing SR, HARQ-ACK and CSI on a PUCCH or piggybacking on a PUSCH once per slot, when SR, HARQ-ACK and CSI are supposed to be sent with the same starting symbols on the PUCCH resources in a slot. *diffSymbol* indicates the UE supports multiplexing SR, HARQ-ACK and CSI on a PUCCH or piggybacking on a PUSCH once per slot, when SR, HARQ-ACK and CSI are supposed to be sent with the different starting symbols in a slot. The UE is mandated to support the multiplexing and piggybacking features indicated by *sameSymbol* while the UE is optional to support the multiplexing and piggybacking features indicated by *diffSymbol*. If the UE indicates *sameSymbol* in this field and does not support *mux-HARQ-ACK-PUSCH-DiffSymbol*, the UE supports HARQ-ACK/CSI piggyback on PUSCH once per slot, when the starting OFDM symbol of the PUSCH is the same as the starting OFDM symbols of the PUCCH resource(s) that would have been transmitted on. If the UE indicates *sameSymbol* in this field and supports *mux-HARQ-ACK-PUSCH-DiffSymbol*, the UE supports HARQ-ACK/CSI piggyback on PUSCH once per slot for which case the starting OFDM symbol of the PUSCH is the different from the starting OFDM symbols of the PUCCH resource(s) that would have been transmitted on.	UE	FD	No	Yes
mux-SR-HARQ-ACK-PUCCH Indicates whether the UE supports multiplexing SR and HARQ-ACK on a PUCCH or piggybacking on a PUSCH once per slot, when SR and HARQ-ACK are supposed to be sent with the different starting symbols in a slot.	UE	No	No	Yes
nzp-CSI-RS-IntefMgmt Indicates whether the UE supports interference measurements using NZP CSI-RS.	UE	No	No	No
oneFL-DMRS-ThreeAdditionalDMRS-UL Defines whether the UE supports DM-RS pattern for UL transmission with 1 symbol front-loaded DM-RS with three additional DM-RS symbols.	UE	No	No	Yes
oneFL-DMRS-TwoAdditionalDMRS-UL Defines support of DM-RS pattern for UL transmission with 1 symbol front-loaded DM-RS with 2 additional DM-RS symbols and more than 1 antenna ports.	UE	Yes	No	Yes
onePortsPTRS Defines whether UE supports PT-RS with 1 antenna port in DL reception and/or UL transmission. It is mandatory with UE capability signalling for FR2 and optional for FR1. The left most in the bitmap corresponds to DL reception and the right most bit in the bitmap corresponds to UL transmission.	UE	CY	No	Yes
onePUCCH-LongAndShortFormat Indicates whether the UE supports transmission of one long PUCCH format and one short PUCCH format in TDM in the same slot.	UE	No	No	Yes
pCell-FR2 Indicates whether the UE supports PCell operation on FR2.	UE	Yes	No	FR2 only
pdcch-MonitoringSingleOccasion Indicates whether the UE supports receiving PDCCH in a search space configured to be monitored within a single span of any three contiguous OFDM symbols in a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing.	UE	No	No	FR1 only
pdcch-BlindDetectionCA Indicates PDCCH blind decoding capabilities supported by the UE for CA with more than 4 CCs as specified in TS 38.213 [11]. The field value is from 4 to 16. NOTE: FR1-FR2 differentiation is not allowed in this release, although the capability signalling is supported for FR1-FR2 differentiation.	UE	No	No	No
pdcch-BlindDetectionMCG-UE Indicates PDCCH blind decoding capabilities supported for MCG when in NR DC. The field value is from 1 to 15. The UE sets the value in accordance with the constraints specified in TS 38.213 [11]. Additionally, if the UE does not report *pdcch-BlindDetectionCA*, and if X is the maximum number of CCs supported by the UE across all NR-DC band combinations then there is at least one parameter pair (X1, X2) such that X1 + X2 = X and the UE supports at least one NR-DC band combination with X1 CCs in MCG and X2 CCs in SCG and for which X1 <= *pdcch-BlindDetectionMCG-UE* and X2 <= *pdcch-BlindDetectionSCG-UE*.	UE	No	No	Yes

pdcch-BlindDetectionSCG-UE Indicates PDCCH blind decoding capabilities supported for SCG when in NR DC. The field value is from 1 to 15. The UE sets the value in accordance with the constraints specified in TS 38.213 [11]. Additionally, if the UE does not report *pdcch-BlindDetectionCA*, and if X is the maximum number of CCs supported by the UE across all NR-DC band combinations then there is at least one parameter pair (X1, X2) such that X1 + X2 = X and the UE supports at least one NR-DC band combination with X1 CCs in MCG and X2 CCs in SCG and for which X1 <= *pdcch-BlindDetectionMCG-UE* and X2 <= *pdcch-BlindDetectionSCG-UE*.	UE	No	No	Yes
pdsch-256QAM-FR1 Indicates whether the UE supports 256QAM modulation scheme for PDSCH for FR1 as defined in 7.3.1.2 of TS 38.211 [6].	UE	Yes	No	FR1 only
pdsch-MappingTypeA Indicates whether the UE supports receiving PDSCH using PDSCH mapping type A with less than seven symbols. This field shall be set to *supported*.	UE	Yes	No	No
pdsch-MappingTypeB Indicates whether the UE supports receiving PDSCH using PDSCH mapping type B.	UE	Yes	No	No
pdsch-RepetitionMultiSlots Indicates whether the UE supports receiving PDSCH scheduled by DCI format 1_1 when configured with higher layer parameter *pdsch-AggregationFactor* > 1, as defined in 5.1.2.1 of TS 38.214 [12].	UE	No	No	No
pdsch-RE-MappingFR1-PerSymbol/pdsch-RE-MappingFR1-PerSlot Indicates the maximum number of supported PDSCH Resource Element (RE) mapping patterns for FR1, each described as a resource (including NZP/ZP CSI-RS, CRS, CORESET and SSB) or bitmap. The number of patterns coinciding in a symbol in a CC and in a slot in a CC are limited by the respective capability parameters. Value n10 means 10 RE mapping patterns and n16 means 16 RE mapping patterns, and so on. The UE shall set the fields *pdsch-RE-MappingFR1-PerSymbol* and *pdsch-RE-MappingFR1-PerSlo*t to at least n10 and n16, respectively. In the exceptional case that the UE does not include the fields, the network may anyway assume that the UE supports the required minimum values.	UE	Yes	No	FR1 only
pdsch-RE-MappingFR2-PerSymbol/pdsch-RE-MappingFR2-PerSlot Indicates the maximum number of supported PDSCH Resource Element (RE) mapping patterns for FR2, each described as a resource (including NZP/ZP CSI-RS, CORESET and SSB) or bitmap. The number of patterns coinciding in a symbol in a CC and in a slot in a CC are limited by the respective capability parameters. Value n6 means 6 RE mapping patterns and n16 means 16 RE mapping patterns, and so on. The UE shall set the fields *pdsch-RE-MappingFR2-PerSymbol* and *pdsch-RE-MappingFR2-PerSlo*t to at least n6 and n16, respectively. In the exceptional case that the UE does not include the fields, the network may anyway assume that the UE supports the required minimum values.	UE	Yes	No	FR2 only
precoderGranularityCORESET Indicates whether the UE supports receiving PDCCH in CORESETs configured with CORESET-precoder-granularity equal to the size of the CORESET in the frequency domain as specified in TS 38.211 [6].	UE	No	No	No
pre-EmptIndication-DL Indicates whether the UE supports interrupted transmission indication for PDSCH reception based on reception of DCI format 2_1 as defined in TS 38.213 [11].	UE	No	No	No
pucch-F2-WithFH Indicates whether the UE supports transmission of a PUCCH format 2 (2 OFDM symbols in total) with frequency hopping in a slot. This field shall be set to *supported*.	UE	Yes	No	Yes
pucch-F3-WithFH Indicates whether the UE supports transmission of a PUCCH format 3 (4~14 OFDM symbols in total) with frequency hopping in a slot. This field shall be set to *supported*.	UE	Yes	No	Yes
pucch-F3-4-HalfPi-BPSK Indicates whether the UE supports pi/2-BPSK for PUCCH format 3/4 as defined in 6.3.2.6 of TS 38.211 [6]. It is optional for FR1 and mandatory with capability signalling for FR2.	UE	CY	No	Yes
pucch-F4-WithFH Indicates whether the UE supports transmission of a PUCCH format 4 (4~14 OFDM symbols in total) with frequency hopping in a slot.	UE	Yes	No	Yes

pusch-RepetitionMultiSlots Indicates whether the UE supports transmitting PUSCH scheduled by DCI format 0_1 when configured with higher layer parameter *pusch-AggregationFactor* > 1, as defined in clause 6.1.2.1 of TS 38.214 [12].	UE	Yes	No	No
pucch-Repetition-F1-3-4 Indicates whether the UE supports transmission of a PUCCH format 1 or 3 or 4 over multiple slots with the repetition factor 2, 4 or 8.	UE	Yes	No	No
pusch-HalfPi-BPSK Indicates whether the UE supports pi/2-BPSK modulation scheme for PUSCH as defined in 6.3.1.2 of TS 38.211 [6]. It is optional for FR1 and mandatory with capability signalling for FR2.	UE	CY	No	Yes
pusch-LBRM Indicates whether the UE supports limited buffer rate matching in UL as specified in TS 38.212 [10].	UE	No	No	Yes
ra-Type0-PUSCH Indicates whether the UE supports resource allocation Type 0 for PUSCH as specified in TS 38.214 [12].	UE	No	No	No
rateMatchingCtrlResrcSetDynamic Indicates whether the UE supports dynamic rate matching for DL control resource set.	UE	Yes	No	No
rateMatchingResrcSetDynamic Indicates whether the UE supports receiving PDSCH with resource mapping that excludes the REs corresponding to resource sets configured with RB-symbol level granularity indicated by *bitmaps* (see *patternType* in *RateMatchPattern* in TS 38.331[9]) based on dynamic indication in the scheduling DCI as specified in TS 38.214 [12].	UE	No	No	No
rateMatchingResrcSetSemi-Static Indicates whether the UE supports receiving PDSCH with resource mapping that excludes the REs corresponding to resource sets configured with RB-symbol level granularity indicated by *bitmaps* and *controlResourceSet* (see *patternType* in *RateMatchPattern* in TS 38.331[9]) following the semi-static configuration as specified in TS 38.214 [12].	UE	Yes	No	No
scs-60kHz Indicates whether the UE supports 60kHz subcarrier spacing for data channel in FR1 as defined in clause 4.2-1 of TS 38.211 [6].	UE	No	No	FR1 only
semiOpenLoopCSI Indicates whether UE supports CSI reporting with report quantity set to 'CRI/RI/i1/CQI ' as defined in clause 5.2.1.4 of TS 38.214 [12].	UE	No	No	Yes
semiStaticHARQ-ACK-Codebook Indicates whether the UE supports HARQ-ACK codebook constructed by semi-static configuration.	UE	Yes	No	No
spatialBundlingHARQ-ACK Indicates whether the UE supports spatial bundling of HARQ-ACK bits carried on PUCCH or PUSCH per PUCCH group. With spatial bundling, two HARQ-ACK bits for a DL MIMO data is bundled into a single bit by logical "AND" operation.	UE	Yes	No	No
spCellPlacement Indicates whether the UE supports a SpCell on FR1-FDD, FR1-TDD and/or FR2-TDD depending on which additional SCells of other frequency range(s) / duplex mode(s) are configured. It is applicable to NR SA and MCG of NR-DC, where UL is configured on more than one of FR1-FDD, FR1-TDD and FR2-TDD in a cell group. If not included, the UE supports SpCell on any serving cell with UL in supported band combinations.	UE	No	No	No
sp-CSI-IM Indicates whether the UE supports semi-persistent CSI-IM.	UE	No	No	Yes
sp-CSI-ReportPUCCH Indicates whether UE supports semi-persistent CSI reporting using PUCCH formats 2, 3 and 4.	UE	No	No	No
sp-CSI-ReportPUSCH Indicates whether UE supports semi-persistent CSI reporting using PUSCH.	UE	No	No	No
sp-CSI-RS Indicates whether the UE supports semi-persistent CSI-RS.	UE	Yes	No	Yes
supportedDMRS-TypeDL Defines supported DM-RS configuration types at the UE for DL reception. Type 1 is mandatory with capability signaling. Type 2 is optional. If this field is not included, Type 1 is supported.	UE	FD	No	Yes

supportedDMRS-TypeUL Defines supported DM-RS configuration types at the UE for UL transmission. Support of both type 1 and type 2 is mandatory with capability signalling. If this field is not included, Type 1 is supported.	UE	FD	No	Yes
tdd-MultiDL-UL-SwitchPerSlot Indicates whether the UE supports more than one switch points in a slot for actual DL/UL transmission(s).	UE	No	TDD only	Yes
tpc-PUCCH-RNTI Indicates whether the UE supports group DCI message based on TPC-PUCCH-RNTI for TPC commands for PUCCH.	UE	No	No	Yes
tpc-PUSCH-RNTI Indicates whether the UE supports group DCI message based on TPC-PUSCH-RNTI for TPC commands for PUSCH.	UE	No	No	Yes
tpc-SRS-RNTI Indicates whether the UE supports group DCI message based on TPC-SRS-RNTI for TPC commands for SRS.	UE	No	No	Yes
twoDifferentTPC-Loop-PUCCH Indicates whether the UE supports two different TPC loops for PUCCH closed loop power control.	UE	Yes	Yes	Yes
twoDifferentTPC-Loop-PUSCH Indicates whether the UE supports two different TPC loops for PUSCH closed loop power control.	UE	Yes	Yes	Yes
twoFL-DMRS Defines whether the UE supports DM-RS pattern for DL reception and/or UL transmission with 2 symbols front-loaded DM-RS without additional DM-RS symbols. The left most in the bitmap corresponds to DL reception and the right most bit in the bitmap corresponds to UL transmission.	UE	Yes	No	Yes
twoFL-DMRS-TwoAdditionalDMRS-UL Defines whether the UE supports DM-RS pattern for UL transmission with 2 symbols front-loaded DM-RS with one additional 2 symbols DM-RS.	UE	Yes	No	Yes
twoPUCCH-AnyOthersInSlot Indicates whether the UE supports transmission of two PUCCH formats in TDM in the same slot, which are not covered by *twoPUCCH-F0-2-ConsecSymbols* and *onePUCCH-LongAndShortFormat*.	UE	No	No	Yes
twoPUCCH-F0-2-ConsecSymbols Indicates whether the UE supports transmission of two PUCCHs of format 0 or 2 in consecutive symbols in a slot.	UE	No	Yes	Yes
type1-PUSCH-RepetitionMultiSlots Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value equal to 2, 4, or 8 with a single repetition of the transport block within each slot, and redundancy version pattern as indicated by UL-TWG-RV-rep. A UE supporting this feature shall also support Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one.	UE	No	No	No
type2-PUSCH-RepetitionMultiSlots Indicates whether the UE supports Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value equal to 2, 4, or 8 with a single repetition of the transport block within each slot, and redundancy version pattern as indicated by UL-TWG-RV-rep. A UE supporting this feature shall also support Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one.	UE	No	No	No
type2-SP-CSI-Feedback-LongPUCCH Indicates whether UE supports Type II CSI semi-persistent CSI reporting over PUCCH Formats 3 and 4 as defined in clause 5.2.4 of TS 38.214 [12].	UE	No	No	No
uci-CodeBlockSegmentation Indicates whether the UE supports segmenting UCI into multiple code blocks depending on the payload size.	UE	Yes	No	Yes
ul-64QAM-MCS-TableAlt Indicates whether the UE supports the alternative 64QAM MCS table for PUSCH with and without transform precoding respectively.	UE	No	No	Yes
ul-SchedulingOffset Indicates whether the UE supports UL scheduling slot offset (K2) greater than 12.	UE	Yes	Yes	Yes

4.2.7.11 Other PHY parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
appliedFreqBandListFilter Mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*.	UE	No	No	No
downlinkSetEUTRA Indicates the features that the UE supports on the DL carriers corresponding to one EUTRA band entry in a band combination by FeatureSetEUTRA-DownlinkId. The FeatureSetEUTRA-DownlinkId = 0 means that the UE does not support a EUTRA DL carrier in this band of a band combination.	Band	N/A	N/A	N/A
downlinkSetNR Indicates the features that the UE supports on the DL carriers corresponding to one NR band entry in a band combination by FeatureSetDownlinkId. The FeatureSetDownlinkId = 0 means that the UE does not support a DL carrier in this band of a band combination. A fallback per band feature set resulting from the reported DL feature set that has fallback per CC feature set is not signalled but the UE shall support it.	Band	N/A	N/A	N/A
featureSetCombinations Pools of feature sets that the UE supports on the NR or MR-DC band combinations.	UE	N/A	No	No
featureSets Pools of downlink and uplink features sets as well as a pool of FeatureSetCombination elements. A FeatureSetCombination refers to the IDs of the feature set(s) that the UE supports in that FeatureSetCombination. The BandCombination entries in the BandCombinationList then indicate the ID of the FeatureSetCombination that the UE supports for that band combination.	UE	N/A	No	No
naics-Capability-List Indicates that UE in MR-DC supports NAICS as defined in TS 36.331 [17].	UE	No	No	No
receivedFilters Contains all filters requested with UE-CapabilityRequestFilterNR from version 15.6.0 onwards.	UE	No	No	No
supportedBandCombinationList Defines the supported NR and/or MR-DC band combinations by the UE. For each band combination the UE identifies the associated feature set combination by featureSetCombinations index referring to featureSetCombination. A fallback band combination resulting from the reported CA and MR-DC band combination is not signalled but the UE shall support it. For intra-band non-contiguous CA band combinations, the UE only includes one band combination, and exclude the others for which the presence of uplink CA bandwidth class in the band combination entry is different. One band combination entry can also indicate support of any other possible permutations in the presence of uplink CA bandwidth class where a paired downlink CA bandwidth class is the same or where the number of UL CCs is smaller than the one of paired DL CCs expressed by the CA bandwidth class, as specified in TS 36.306 [15]. For these band combinations not included in the capability, the supported feature set is the same as the ones for the band combination included in the UE capability.	UE	Yes	No	No
supportedBandCombinationListNEDC-Only Defines the supported NE-DC only type of band combinations by the UE.	UE	No	No	No
supportedBandListNR Includes the supported NR bands as defined in TS 38.101-1 [2] and TS 38.101-2 [3].	UE	Yes	No	No
uplinkSetEUTRA Indicates the features that the UE supports on the UL carriers corresponding to one EUTRA band entry in a band combination by FeatureSetEUTRA-UplinkId. The FeatureSetUplinkId = 0 means that the UE does not support a UL carrier in this band of a band combination.	Band	N/A	N/A	N/A
uplinkSetNR Indicates the features that the UE supports on the UL carriers corresponding to one NR band entry in a band combination by FeatureSetUplinkId. The FeatureSetUplinkId = 0 means that the UE does not support a UL carrier in this band of a band combination. A fallback per band feature set resulting from the reported UL feature set that has fallback per CC feature set is not signalled but the UE shall support it.	Band	N/A	N/A	N/A

4.2.7.12 *NRDC-Parameters*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
sfn-SyncNRDC Indicates the UE supports NR-DC only with SFN and frame synchronization between PCell and PSCell. If not included by the UE supporting NR-DC, the UE supports NR-DC with slot-level synchronization without condition on SFN and frame synchronization.	UE	No	No	No

4.2.7.13 *CarrierAggregationVariant*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
fr1fdd-FR1TDD-CA-SpCellOnFR1FDD Indicates whether the UE supports an FR1 FDD SpCell (and possibly SCells) when configured with an FR1 TDD SCell.	UE	No	No	No
fr1fdd-FR1TDD-CA-SpCellOnFR1TDD Indicates whether the UE supports an FR1 TDD SpCell (and possibly SCells) when configured with an FR1 FDD SCell.	UE	No	No	No
fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR1FDD Indicates whether the UE supports an FR1 FDD SpCell (and possibly SCells) when configured with an FR1 TDD SCell and an FR2 TDD SCell.	UE	No	No	No
fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR1TDD Indicates whether the UE supports an FR1 TDD SpCell (and possibly SCells) when configured with an FR1 FDD SCell and an FR2 TDD SCell.	UE	No	No	No
fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR2TDD Indicates whether the UE supports an FR2 TDD SpCell (and possibly SCells) when configured with an FR1 FDD SCell and an FR1 TDD SCell.	UE	No	No	No
fr1fdd-FR2TDD-CA-SpCellOnFR1FDD Indicates whether the UE supports an FR1 FDD SpCell (and possibly SCells) when configured with an FR2 TDD SCell.	UE	No	No	No
fr1fdd-FR2TDD-CA-SpCellOnFR2TDD Indicates whether the UE supports an FR2 TDD SpCell (and possibly SCells) when configured with an FR1 FDD SCell.	UE	No	No	No
fr1tdd-FR2TDD-CA-SpCellOnFR1TDD Indicates whether the UE supports an FR1 TDD SpCell (and possibly SCells) when configured with an FR2 TDD SCell.	UE	No	No	No
fr1tdd-FR2TDD-CA-SpCellOnFR2TDD Indicates whether the UE supports an FR2 TDD SpCell (and possibly SCells) when configured with an FR1 TDD SCell.	UE	No	No	No

4.2.8 Void

4.2.9 *MeasAndMobParameters*

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
csi-RS-RLM Indicates whether the UE can perform radio link monitoring procedure based on measurement of CSI-RS as specified in TS 38.213 [11] and TS 38.133 [5]. This parameter needs FR1 and FR2 differentiation. If the UE supports this feature, the UE needs to report *maxNumberResource-CSI-RS-RLM*.	UE	Yes	No	Yes
csi-RSRP-AndRSRQ-MeasWithSSB Indicates whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS 38.215 [13], where CSI-RS resource is configured with an associated SS/PBCH. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell. If the UE supports this feature, the UE needs to report *maxNumberCSI-RS-RRM-RS-SINR*.	UE	No	No	Yes
csi-RSRP-AndRSRQ-MeasWithoutSSB Indicates whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS 38.215 [13], where CSI-RS resource is configured for a cell that transmits SS/PBCH block and without an associated SS/PBCH block. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell. If the UE supports this feature, the UE needs to report *maxNumberCSI-RS-RRM-RS-SINR*.	UE	No	No	Yes
csi-SINR-Meas Indicates whether the UE can perform CSI-SINR measurements based on configured CSI-RS resources as specified in TS 38.215 [13]. If this parameter is indicated for FR1 and FR2 differently, each indication corresponding to the frequency range of measured target cell. If the UE supports this feature, the UE needs to report *maxNumberCSI-RS-RRM-RS-SINR*.	UE	No	No	Yes
eutra-CGI-Reporting Defines whether the UE supports acquisition of relevant information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the (NG)EN-DC and NE-DC are not configured or, when consistent DRX is configured in NR-DC. The consistent DRX configuration implies that MN and SN have the same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN. It is mandated if the UE supports EUTRA.	UE	CY	No	No
eutra-CGI-Reporting-NEDC Defines whether the UE supports acquisition of relevant information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the NE-DC is configured.	UE	No	No	No
eutra-CGI-Reporting-NRDC Defines whether the UE supports acquisition of relevant information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the NR-DC is configured wherein MN and SN have different DRX cycles, or on-duration configured by MN does not contain on-duration configured by SN if the DRX cycles are the same.	UE	No	No	No
eventA-MeasAndReport Indicates whether the UE supports NR measurements and events A triggered reporting as specified in TS 38.331 [9]. This field only applies to SN configured measurement when (NG)EN-DC is configured. For NR MCG, this feature is mandatory supported.	UE	Yes	Yes	No
eventB-MeasAndReport Indicates whether the UE supports EUTRA measurement and event B triggered reporting as specified in TS 38.331 [9]. It is mandated if the UE supports EUTRA.	UE	CY	No	No
handoverLTE-5GC Indicates whether the UE supports HO to EUTRA connected to 5GC. It is mandated if the UE supports EUTRA connected to 5GC.	UE	CY	Yes	Yes
handoverFDD-TDD Indicates whether the UE supports HO between FDD and TDD. It is mandated if the UE supports both FDD and TDD. This field only applies to NR SA/NR-DC/ NE-DC (e.g. PCell handover). For PSCell change when (NG)EN-DC/NR-DC is configured, this feature is mandatory supported. UEs supporting this shall indicate support of *handoverInterF* for both FDD and TDD.	UE	Yes	No	No

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
handoverFR1-FR2 Indicates whether the UE supports HO between FR1 and FR2. Support is mandatory for the UE supporting both FR1 and FR2. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover). For PSCell change when (NG)EN-DC/NR-DC is configured, this feature is mandatory supported. UEs supporting this shall indicate support of *handoverInterF* for both FR1 and FR2.	UE	Yes	No	No
handoverInterF Indicates whether the UE supports inter-frequency HO. It indicates the support for inter-frequency HO from the corresponding duplex mode and from frequency range indicated to be supported as described in Annex B. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover). For PSCell change when (NG)EN-DC/NR-DC is configured, this feature is mandatory supported.	UE	Yes	Yes	Yes
handoverLTE-EPC Indicates whether the UE supports HO to EUTRA connected to EPC. It is mandated if the UE supports EUTRA connected to EPC.	UE	CY	Yes	Yes
independentGapConfig This field indicates whether the UE supports two independent measurement gap configurations for FR1 and FR2 specified in clause 9.1.2 of TS 38.133 [5]. The field also indicates whether the UE supports the FR2 inter-RAT measurement without gaps when (NG)EN-DC is not configured.	UE	No	No	No
intraAndInterF-MeasAndReport Indicates whether the UE supports NR intra-frequency and inter-frequency measurements and at least periodical reporting. This field only applies to NE-DC and SN configured measurement when (NG)EN-DC is configured. For NR MCG, this feature is mandatory supported.	UE	Yes	Yes	No
periodicEUTRA-MeasAndReport Indicates whether the UE supports periodic EUTRA measurement and reporting. It is mandated if the UE supports EUTRA.	UE	CY	No	No
maxNumberCSI-RS-RRM-RS-SINR Defines the maximum number of CSI-RS resources for RRM and RS-SINR measurement across all measurement frequencies per slot. If UE supports any of *csi-RSRP-AndRSRQ-MeasWithSSB*, *csi-RSRP-AndRSRQ-MeasWithoutSSB*, and *csi-SINR-Meas*, UE shall report this capability.	UE	CY	No	No
maxNumberResource-CSI-RS-RLM Defines the maximum number of CSI-RS resources within a slot per spCell for CSI-RS based RLM. If UE supports any of *csi-RS-RLM* and *ssb-AndCSI-RS-RLM*, UE shall report this capability.	UE	CY	No	Yes
nr-CGI-Reporting Defines whether the UE supports acquisition of relevant information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when (NG)EN-DC and NE-DC are not configured or, when consistent DRX is configured in NR-DC. The consistent DRX configuration implies that MN and SN have the same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN.	UE	Yes	No	No
nr-CGI-Reporting-ENDC Defines whether the UE supports acquisition of relevant information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the (NG)EN-DC is configured.	UE	Yes	No	No
nr-CGI-Reporting-NEDC Defines whether the UE supports acquisition of relevant information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the NE-DC is configured.	UE	Yes	No	No
nr-CGI-Reporting-NRDC Defines whether the UE supports acquisition of relevant information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the NR-DC is configured wherein MN and SN have different DRX cycles, or on-duration configured by MN does not contain on-duration configured by SN if the DRX cycles are the same.	UE	Yes	No	No

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
simultaneousRxDataSSB-DiffNumerology Indicates whether the UE supports concurrent intra-frequency measurement on serving cell or neighbouring cell and PDCCH or PDSCH reception from the serving cell with a different numerology as defined in clause 8 and 9 of TS 38.133 [5].	UE	No	No	Yes
sftd-MeasPSCell Indicates whether the UE supports SFTD measurements between the PCell and a configured PSCell. If this capability is included in UE-MRDC-Capability, it indicates that the UE supports SFTD measurement between PCell and PSCell in (NG)EN-DC. If this capability is included in UE-NR-Capability, it indicates that the UE supports SFTD measurement between PCell and PSCell in NR-DC.	UE	No	Yes	No
sftd-MeasPSCell-NEDC Indicates whether the UE supports SFTD measurement between the NR PCell and a configured E-UTRA PSCell in NE-DC.	UE	No	Yes	No
sftd-MeasNR-Cell Indicates whether the SFTD measurement with and without measurement gaps between the EUTRA PCell and the NR cells is supported by the UE which is capable of EN-DC/NGEN-DC when EN-DC/NGEN-DC is not configured. The SFTD measurement without gaps can be used when the UE supports at least one EN-DC band combination consisting of the set of the current E-UTRA serving frequencies and the NR frequency where SFTD measurement is configured. In UE-NR-Capability, this field is not used, and UE does not include the field.	UE	No	Yes	No
sftd-MeasNR-Neigh Indicates whether the inter-frequency SFTD measurement with and without measurement gaps between the NR PCell and inter-frequency NR neighbour cells is supported by the UE when MR-DC is not configured. The SFTD measurement without gaps can be used when the UE supports at least one DC or CA band combination consisting of the set of the current NR serving frequencies and the NR frequency where SFTD measurement is configured.	UE	No	Yes	No
sftd-MeasNR-Neigh-DRX Indicates whether the inter-frequency SFTD measurement using DRX off period between the NR PCell and the inter-frequency NR neighbour cells is supported by the UE when MR-DC is not configured.	UE	No	Yes	No
ssb-RLM Indicates whether the UE can perform radio link monitoring procedure based on measurement of SS/PBCH block as specified in TS 38.213 [11] and TS 38.133 [5]. This field shall be set to *supported*.	UE	Yes	No	No
ssb-AndCSI-RS-RLM Indicates whether the UE can perform radio link monitoring procedure based on measurement of SS/PBCH block and CSI-RS as specified in TS 38.213 [11] and TS 38.133 [5]. If the UE supports this feature, the UE needs to report *maxNumberResource-CSI-RS-RLM*.	UE	No	No	No
ss-SINR-Meas Indicates whether the UE can perform SS-SINR measurement as specified in TS 38.215 [13]. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell.	UE	No	No	Yes
supportedGapPattern Indicates measurement gap pattern(s) optionally supported by the UE for NR SA, for NR-DC, for NE-DC and for independent measurement gap configuration on FR2 in (NG)EN-DC. The leading / leftmost bit (bit 0) corresponds to the gap pattern 2, the next bit corresponds to the gap pattern 3, as specified in TS 38.133 [5] and so on. The UE shall set the bits corresponding to the measurement gap pattern 13 and 14 to 1 if the UE is an NR standalone capable UE that supports a band in FR2 or if the UE is an (NG)EN-DC capable UE that supports *independentGapConfig* and supports a band in FR2.	UE	CY	No	No

4.2.10 Inter-RAT parameters

Definitions for parameters	Per	M	FDD-TDD DIFF
mfbi-EUTRA Indicates whether the UE supports the mechanisms defined for cells broadcasting multi band information i.e. comprehending *multiBandInfoList* defined in TS 36.331 [17].	UE	Yes	No
modifiedMPR-BehaviorEUTRA *modifiedMPR-Behavior* in 4.3.5.10, TS 36.306 [15].	UE	No	No
multiNS-Pmax-EUTRA *multiNS-Pmax* defined in 4.3.5.16, TS 36.306 [15].	UE	No	No
ne-DC Indicates whether the UE supports NE-DC as specified in TS 37.340 [7].	UE	No	No
rs-SINR-MeasEUTRA *rs-SINR-Meas* in 4.3.6.13, TS 36.306 [15].	UE	No	No
rsrqMeasWidebandEUTRA *rsrqMeasWideband* in 4.3.6.2, TS 36.306 [15]. If this parameter is indicated for FDD and TDD differently, each indication corresponds to the duplex mode of measured target cell.	UE	No	Yes
supportedBandListEUTRA *supportedBandListEUTRA* defined in 4.3.5.1, TS 36.306 [15].	UE	No	No

4.2.10.1 Void

4.2.10.2 Void

4.2.11 Void

4.2.12 Void

4.2.13 IMS Parameters

Definitions for parameters	Per	M	FDD-TDD DIFF	FR1-FR2 DIFF
voiceOverEUTRA-5GC Indicates whether the UE supports IMS voice over E-UTRA via 5GC. It is mandated to the UE if the UE is capable of IMS voice over E-UTRA via 5GC. Otherwise, the UE does not include this field. If this field is included and the UE is capable of E-UTRA with EPC, the UE shall support IMS voice over E-UTRA via EPC.	UE	No	No	No
voiceOverNR Indicates whether the UE supports IMS voice over NR. It is mandated to the UE if the UE is capable of IMS voice over NR. Otherwise, the UE does not include this field. If this field is included and the UE is capable of E-UTRA with EPC, the UE shall support IMS voice over E-UTRA via EPC.	UE	No	No	Yes
voiceOverSCG-BearerEUTRA-5GC Indicates whether the UE supports IMS voice over SCG bearer of NE-DC.	UE	No	No	N/A

NOTE: In this release of specification, IMS voice over split bearer is not supported for NR-DC and NE-DC.

4.2.14 RRC buffer size

The RRC buffer size is defined as the maximum overall RRC configuration size that the UE is required to store. The RRC buffer size is 45Kbytes.

5 Optional features without UE radio access capability parameters

5.1 PWS features

Definitions for feature
CMAS It is optional for UE to support CMAS reception as specified in TS 38.331 [9]. It is optional for a CMAS-capable UE to support Geofencing information (*warningAreaCoordinates*) as specified in TS 38.331 [9].
ETWS It is optional for UE to support ETWS reception as specified in TS 38.331 [9].
KPAS It is optional for UE to support Korean Public Alert System (KPAS) reception as specified in TS 38.331 [9]. KPAS uses the same AS mechanisms as defined for CMAS. Therefore a KPAS-capable UE shall support all behaviour that is included in TS 38.331 [9] and TS 38.304 [20] for a CMAS-capable UE.
EU-Alert It is optional for UE to support EU-Alert reception as specified in TS 38.331 [9]. EU-Alert uses the same AS mechanisms as defined for CMAS. Therefore a EU-Alert-capable UE shall support all behaviour that is included in TS 38.331 [9] and TS 38.304 [20] for a CMAS-capable UE.

5.2 UE receiver features

Definitions for feature
SU-MIMO Interference Mitigation advanced receiver - R-ML (reduced complexity ML) receivers with enhanced inter-stream interference suppression for SU-MIMO transmissions with rank 2 with 2 RX antennas - R-ML (reduced complexity ML) receivers with enhanced inter-stream interference suppression for SU-MIMO transmissions with rank 2, 3, and 4 with 4 RX antennas UE supporting the feature is required to meet the Enhanced Receiver Type requirements in TS 38.101-4 [18].

5.3 RRC connection

Definitions for feature
RRC connection release with deprioritisation It is optional for UE to support *RRCRelease* with *deprioritisationReq* as specified in TS 38.331 [9].
RRC connection establishment failure with temporary offset It is optional for UE to support RRC connection establishment failure with temporary offset (*Qoffsettemp*) as specified in TS 38.331 [9].

6 Conditionally mandatory features without UE radio access capability parameters

Features	Condition
Skipping UL configured grant if no data to transmit.	Either *configuredUL-GrantType1* or *configuredUL-GrantType2* is supported.
Downlink SDAP header	Either NAS reflective QoS or *as-ReflectiveQoS* is supported.
IMS emergency call	It is mandatory to support IMS emergency call for UEs which are IMS voice capable in NR.

7 Void

8 UE Capability Constraints

The following table lists constraints indicating the UE capabilities that the UE shall support.

Parameter	Description	Value
#DRBs	The number of DRBs that a UE shall support.	16 per UE. NOTE1 NOTE3
#minCellperMeasObjectNR	The minimum number of neighbour cells (excluding black list cells) that a UE shall be able to store associated with a MeasObjectNR.	32 NOTE 2
#minBlackCellRangesperMeasObjectNR	The minimum number of blacklist cell PCI ranges that a UE shall be able to store associated with a MeasObjectNR.	8
#minBlackCellperMeasObjectEUTRA	The minimum number of blacklist cells that a UE shall be able to store associated with a MeasObjectEUTRA.	32
#minCellperMeasObjectEUTRA	The minimum number of neighbour cells that a UE shall be able to store associated with a MeasObjectEUTRA.	32 NOTE 2
#minCellTotal	The minimum number of neighbour cells (excluding black list cells) that UE shall be able to store in total from all measurement objects configured.	256 with counting CSI-RS and SSB as 2.
#maxDeprioritisationFreq	The UE shall be able to store a depriotisation request for up to 8 frequencies (applicable when receiving another frequency specific deprioritisation request via *RRCRelease* before T325 expiry).	8
NOTE 1: For one MAC entity, the maximum number of DRBs configured with PDCP duplication and with RLC entity(ies) associated with this MAC entity is 8. NOTE 2: In case of CGI reporting, the limit regarding the cells configured includes the cell for which the UE is requested to report CGI i.e. the amount of neighbour cells that can be included is at most (# minCellperMeasObjectRAT - 1), where RAT represents NR and EUTRA. NOTE 3: This requirement is applicable in NR SA, NR-DC and NE-DC.		

Annex A (normative): Differentiation of capabilities

Annex A.1: TDD/FDD differentiation of capabilities in TDD-FDD CA

Annex A.1 specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature/capability for which it indicates support within the capability signalling.

A UE that indicates support for TDD/FDD CA (e.g. MCG or SCG):

- For the fields for which the UE is allowed to indicate different support for FDD and TDD, the UE shall support the feature on the PCell and/or SCell(s), as specified in tables A.1-1 in accordance to the following rules:
  - PCell: the UE shall support the feature for the PCell, if the UE indicates support of the feature for the PCell duplex mode;
  - PSCell: the UE shall support the feature for the PSCell, if the UE indicates support of the feature for the PSCell duplex mode;
  - Per serving cell: the UE shall support the feature for a serving cell if the UE indicates support of the feature for the serving cell's duplex mode;
  - All serving cells: UE shall support the feature for all serving cells in a CG if the UE indicates support of the feature for both TDD and FDD duplex modes;
  - Associated serving cells: UE shall support the feature if the UE indicates support of the feature for all associated serving cells's duplex modes;
- For the fields where the UE is not allowed to indicate different support for FDD and TDD, the UE shall support the feature for PCell and SCell(s) if the UE indicates support of the feature via the common capability bit.

Table A.1-1: UE capabilities for which FDD/TDD differentiation is allowed

UE-NR-Capability or UE-MRDC-Capability	Classification
eventA-MeasAndReport	PSCell
dl-SchedulingOffset-PDSCH-TypeA (Note3)	Associated serving cells
dl-SchedulingOffset-PDSCH-TypeB (Note3)	Associated serving cells
dynamicSFI (Note3)	Associated serving cells
handoverInterF	PCell
handoverLTE-EPC	PCell
handoverLTE-5GC	PCell
intraAndInterF-MeasAndReport	PSCell
logicalChannelSR-DelayTimer(Note2)	Associated serving cells
longDRX-Cycle	All serving cells
multipleConfiguredGrants(Note1)	Associated serving cells
multipleSR-Configurations	Per serving cell
sftd-MeasNR-Cell	PCell
sftd-MeasNR-Neigh	PCell
sftd-MeasNR-Neigh-DRX	PCell
sftd-MeasPSCell	PCell
sftd-MeasPSCell-NEDC	PCell
shortDRX-Cycle	All serving cells
skipUplinkTxDynamic	Per serving cell
twoDifferentTPC-Loop-PUCCH (Note3)	Associated serving cells
twoDifferentTPC-Loop-PUSCH (Note3)	Associated serving cells
ul-SchedulingOffset (Note3)	Associated serving cells
NOTE 1: The associated serving cells including the serving cell(s) configured with configured grant. NOTE 2: For a given logical channel, the associated serving cells including the PUCCH cell(s) associated with this logical channel (via *schedulingRequestID*). NOTE 3: The associated serving cells including both the cell sending the command and the cell applying the command.	

Annex A.2: FR1/FR2 differentiation of capabilities in FR1-FR2 CA

Annex A.2 specifies for which FR1 and FR2 serving cells a UE supporting FR1/FR2 CA shall support a feature/capability for which it indicates support within the capability signalling.

A UE that indicates support for FR1/FR2 CA (e.g. MCG or SCG):

- For the fields for which the UE is allowed to indicate different support for FR1 and FR2, the UE shall support the feature on the PCell and/or SCell(s), as specified in tables A.2-1 in accordance to the following rules:
  - PCell: the UE shall support the feature for the PCell, if the UE indicates support of the feature for the PCell FR mode;
  - Associated serving cells: UE shall support the feature if the UE indicates support of the feature for associated serving cells's FR modes;
- For the fields where the UE is not allowed to indicate different support for FR1 and FR2, the UE shall support the feature for PCell and SCell(s) if the UE indicates support of the feature via the common capability bit.

Table A.2-1: Rel-15 UE capabilities for which FR1/FR2 differentiation is allowed

UE-NR-Capability	Classification
absoluteTPC-Command (Note2)	Associated serving cells
dl-SchedulingOffset-PDSCH-TypeA (Note2)	Associated serving cells
dl-SchedulingOffset-PDSCH-TypeB (Note2)	Associated serving cells
dynamicSFI (Note2)	Associated serving cells
handoverInterF	PCell
handoverLTE-EPC	PCell
handoverLTE-5GC	PCell
tpc-PUCCH-RNTI (Note2)	Associated serving cells
tpc-PUSCH-RNTI (Note2)	Associated serving cells
tpc-SRS-RNTI (Note2)	Associated serving cells
twoDifferentTPC-Loop-PUCCH (Note2)	Associated serving cells
twoDifferentTPC-Loop-PUSCH (Note2)	Associated serving cells
ul-SchedulingOffset (Note2)	Associated serving cells
voiceOverNR (Note1)	Associated serving cells.
NOTE 1: For a UE that does not support *lch-ToSCellRestriction* capability, the associated serving cells includes all serving cells in the CG; for a UE that supports *lch-ToSCellRestriction* capability, the associated serving cells includes the serving cells indicated by *allowedServingCells* for the LCH. NOTE 2: The associated serving cells including both the cell sending the command and the cell applying the command.	

Annex A.3: Void

Annex A.4: Void

Annex A.5: General differentiation of capabilities in Cross-Carrier operation

Annex A.5 specifies for which multiple serving cells a UE supporting cross-carrier operation shall support a feature/capability for which it indicates support within the capability signalling.

A UE that indicates support for cross-carrier operation in CA (e.g. MCG or SCG):

- For the fields for which the UE is allowed to indicate different support for different bands, the UE shall support the feature on the PCell and/or SCell(s) in cross-carrier operation, as specified in tables A.5-1 in accordance to the following rules:

  - Triggered serving cell: the UE shall support the feature if the UE indicates support of the feature for the band of the scheduled/triggered/indicated serving cell;

  - Triggering&Triggered serving cells: UE shall support the feature if the UE indicates support of the feature for the band of both the scheduling/triggering/indicating serving cell and the scheduled/triggered/indicated serving cell;

Table A.5-1: General UE capabilities for which differentiation is allowed

UE-NR-Capability	Classification
aperiodicTRS	Triggered serving cell
beamSwitchTiming	Triggered serving cell
bwp-DiffNumerology (NOTE 1)	Triggering&Triggered serving cells
bwp-SameNumerology (NOTE 1)	Triggering&Triggered serving cells
crossCarrierScheduling-SameSCS	Triggering&Triggered serving cells
ue-SpecificUL-DL-Assignment	Triggering&Triggered serving cells
NOTE 1: For *bwp-DiffNumerology* and *bwp-SameNumerology*, the supported number of BWPs for each band is still based on the indicated number for this band regardless of whether it is a scheduling cell or scheduled cell.	

Annex B (informative): UE capability indication for UE capabilities with both FDD/TDD and FR1/FR2 differentiations

Annex B clarifies the UE capability indication for the case where the UE is allowed to support different functionality between FDD and TDD, and between FR1 and FR2. Table B-1 clarifies the setting of UE capability fields for cases where the UE supports the corresponding feature in different combinations of duplex mode and frequency range. There are two possible ways of UE capability indication in Case 3 and Case 8.

Table B-1: UE capability indication for UE capabilities with both FDD/TDD and FR1/FR2 differentiations

Support for the feature		Setting of UE capability fields					
		Common UE capability (with suffix '-XDD-Diff')	**Common UE capability (with suffix '-FRX-diff')**	**fdd-Add-UE-NR/MRDC-Capabilities**	**tdd-Add-UE-NR/MRDC-Capabilities**	**fr1-Add-UE-NR/MRDC-Capabilities**	**fr2-Add-UE-NR/MRDC-Capabilities**
Case 1	FR1 FDD: 'supported' FR1 TDD: 'supported' FR2 TDD: 'supported'	Included	Included	Not included	Not included	Not included	Not included
Case 2	FR1 FDD: 'not supported' FR1 TDD: 'not supported' FR2 TDD: 'not supported'	Not included	Not included	Not included	Not included	Not included	Not included
Case 3	FR1 FDD: 'not supported'	Not included	Included	Not included	Included	Not included	Not included
	FR1 TDD: 'supported' FR2 TDD: 'supported'	Not included	Not included	Not included	Included	Not included	Not included
Case 4	FR1 FDD: 'not supported' FR1 TDD: 'not supported' FR2 TDD: 'supported'	Not included	Not included	Not included	Included	Not included	Included
Case 5	FR1 FDD: 'not supported' FR1 TDD: 'supported' FR2 TDD: 'not supported'	Not included	Not included	Not included	Included	Included	Not included
Case 6	FR1 FDD: 'supported' FR1 TDD: 'not supported' FR2 TDD: 'supported'	The current UE capability signalling does not support the UE capability indication for this case.					
Case 7	FR1 FDD: 'supported' FR1 TDD: 'not supported' FR2 TDD: 'not supported'	Not included	Not included	Included	Not included	Included	Not included
Case 8	FR1 FDD: 'supported'	Included	Not included	Not included	Not included	Included	Not included
	FR1 TDD: 'supported' FR2 TDD: 'not supported'	Not included	Not included	Not included	Not included	Included	Not included

Annex C (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
06/2017	RAN2#98	R2-1704810				First version	0.0.1
06/2017	RAN2#NR2	R2-1707386					0.0.2
08/2017	RAN2#99	R2-1708750					0.0.3
12/2017	RAN2#100	R2-1712587					0.0.4
12/2017	RAN2#100	R2-1714141					0.0.5
12/2017	RAN2#100	R2-1714271					0.1.0
12/2017	RP-78	RP-172521				Submitted to RAN#78 for approval	1.0.0
12/2017	RP-78					Upgraded to Rel-15	15.0.0
03/2018	RP-79	RP-180440	0003	3	F	Updates on UE capabilities	15.1.0
06/2018	RP-80	RP-181216	0009	2	B	Introduce ANR in NR	15.2.0
	RP-80	RP-181216	0012	1	F	Miscellaneous corrections	15.2.0
	RP-80	RP-181216	0013	-	B	Delay budget report and MAC CE adaptation for NR for TS 38.306	15.2.0
09/2018	RP-81	RP-181940	0008	4	F	Correction on total layer2 buffer size	15.3.0
	RP-81	RP-181942	0024	1	F	Introduction of UE capability constraints	15.3.0
	RP-81	RP-181942	0030	-	F	38.306 corrections and cleanup	15.3.0
12/2018	RP-82	RP-182651	0016	4	F	Clarification for Interruption-based and gap-based SFTD measurement	15.4.0
	RP-82	RP-182653	0033	1	F	Timer based BWP switching	15.4.0
	RP-82	RP-182652	0035	2	F	Additional UE capabilities for NR standalone	15.4.0
	RP-82	RP-182651	0037	1	F	Clarification to UE capability of independentGapConfig for inter-RAT NR measurement not yet configured with EN-DC	15.4.0
	RP-82	RP-182661	0038	2	F	Update of L2 capability parameters	15.4.0
	RP-82	RP-182660	0047	2	F	Clarification on physical layer parameters of UE capability	15.4.0
	RP-82	RP-182666	0050	3	F	Introduce RRC buffer size in NR	15.4.0
	RP-82	RP-182664	0051	2	F	Clarification of multipleConfiguredGrants	15.4.0
	RP-82	RP-182664	0052	2	F	CR to 38.306 for PDCP CA duplication for SRB	15.4.0
	RP-82	RP-182661	0054	1	F	UE capability handling for FDD/TDD and FR1/FR2	15.4.0
	RP-82	RP-182663	0057	1	F	Clarify for per CC UL/DL modulation order capabilities	15.4.0
	RP-82	RP-182664	0058	1	F	Inter-frequency handover capability	15.4.0
	RP-82	RP-182665	0060	3	F	UE capability on PA architecture	15.4.0
	RP-82	RP-182661	0062	1	F	CR on signaling contiguous and non-contiguous EN-DC capability	15.4.0
	RP-82	RP-182813	0063	6	F	Update of UE capabilities	15.4.0
	RP-82	RP-182662	0065	2	F	Introduction of SRS switching capability	15.4.0
	RP-82	RP-182667	0068	2	B	CR on introduction of UE overheating support in NR SA scenario	15.4.0
	RP-82	RP-182664	0071	-	F	Introduction of SRS switching capability	15.4.0
03/2019	RP-83	RP-190634	0073	1	F	Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS	15.5.0
	RP-83	RP-190542	0074	1	F	Layer-1 capability update	15.5.0
	RP-83	RP-190545	0075	2	F	CR to 38.306 on introducing nr-CGI-Reporting-ENDC	15.5.0
	RP-83	RP-190545	0086	2	F	CR to clarify intra-NR handover capabilities	15.5.0
	RP-83	RP-190546	0088	3	F	Clarification for PDSCHs and PUSCHs per slot for different TBs for UE capable of processing time capability 1	15.5.0
	RP-83	RP-190542	0092	2	F	Correction to mandatory supported capability signaling	15.5.0
	RP-83	RP-190542	0097	2	F	Miscellaneous corrections	15.5.0
	RP-83	RP-190545	0098	2	F	Correction on supportedBandwidthCombinationSetEUTRA-v1530 usage	15.5.0
	RP-83	RP-190543	0099	-	F	Clarification on signaling the bandwidth class	15.5.0
	RP-83	RP-190545	0100	1	F	Clarification on Frequency Separation Class	15.5.0
	RP-83	RP-190544	0101	-	F	CR on Processing delay requirements for RRC Resume procedures in TS 38.306	15.5.0
06/2019	RP-84	RP-191375	0094	1	F	CR to clarify ul-TimingAlignmentEUTRA-NR	15.6.0
	RP-84	RP-191373	0108	-	F	Layer-1, RF and RRM capability updates	15.6.0
	RP-84	RP-191373	0109	-	F	Clarification on UE capability of lch-ToSCellRestriction	15.6.0
	RP-84	RP-191379	0110	2	F	Correction on description of additionalActiveSpatialRelationPUCCH	15.6.0
	RP-84	RP-191378	0111	1	F	Clarification on csi-RS-CFRA-ForHO	15.6.0
	RP-84	RP-191379	0114	2	F	CR on capability of maxUplinkDutyCycle for FR2	15.6.0
	RP-84	RP-191380	0115	2	F	38.306 miscellaneous corrections	15.6.0
	RP-84	RP-191378	0116	1	B	38.306 CR for late drop	15.6.0
	RP-84	RP-191381	0118	4	F	Clarification on supported modulation order capability	15.6.0
	RP-84	RP-191374	0119	-	F	Correction to PDCP parameters	15.6.0
	RP-84	RP-191381	0121	3	F	Corrections to UE Capability definitions	15.6.0
	RP-84	RP-191378	0122	1	F	38.306 Clarification on multiple TA capabilities	15.6.0
	RP-84	RP-191379	0123	2	F	CR to clarify non-codebook based PUSCH transmission	15.6.0
	RP-84	RP-191380	0124	3	F	Clarification on pdsch-ProcessingType2	15.6.0

	RP-84	RP-191378	0125	1	F	Clarification on present of tci-StatePDSCH	15.6.0
	RP-84	RP-191378	0126	1	F	Clarification on SA fallback BC support	15.6.0
	RP-84	RP-191375	0128	-	F	Correction to Beam Correspondence for CA	15.6.0
	RP-84	RP-191379	0130	2	F	Correction on the number of DRB in UE Capability Constraints	15.6.0
	RP-84	RP-191379	0132	1	F	CR to capture UE supported DL/UL bandwidths	15.6.0
	RP-84	RP-191376	0133	-	F	UE capability signalling for FD-MIMO processing capabilities for EN-DC	15.6.0
	RP-84	RP-191376	0134	-	F	Modified UE capability on different numerologies within the same PUCCH group	15.6.0
	RP-84	RP-191554	0135	-	F	Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS"	15.6.0
09/2019	RP-85	RP-192196	0136	1	C	Additional capability signalling for 1024QAM support	15.7.0
	RP-85	RP-192191	0142	1	B	Introduction of SFTD measurement to neighbour cells for NR SA	15.7.0
	RP-85	RP-192193	0146	1	F	MR-DC measurement gap pattern capability	15.7.0
	RP-85	RP-192194	0151	3	F	Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4	15.7.0
	RP-85	RP-192190	0152	-	F	Clarification to dynamic power sharing capability	15.7.0
	RP-85	RP-192192	0153	2	F	Miscellaneous corrections	15.7.0
	RP-85	RP-192190	0154	-	F	Capability of measurement gap patterns	15.7.0
	RP-85	RP-192193	0155	2	F	Correction to IMS capability	15.7.0
	RP-85	RP-192194	0156	3	F	UE Capabilities covering across all serving cells	15.7.0
	RP-85	RP-192190	0167	-	F	Clarification on UE capability on different numerologies within the same PUCCH group	15.7.0
	RP-85	RP-192193	0168	1	F	Correction on CA parameters in NR-DC	15.7.0
	RP-85	RP-192346	0169	-	C	Introduction of UE capability for NR-DC with SFN synchronization between PCell and PSCell	15.7.0
12/2019	RP-86	RP-192934	0185	1	F	Clarification on the restriction of maximum SRS resource sets configuration for uplink beam management.	15.8.0
	RP-86	RP-192936	0186	3	F	Miscellaneous corrections on UE capability fields	15.8.0
	RP-86	RP-192935	0191	1	F	Corrections on PDCCH blind decoding in NR-DC	15.8.0
	RP-86	RP-192937	0200	1	F	Clarification on ne-DC capability	15.8.0
	RP-86	RP-192935	0202	1	F	Correction to channelBWs	15.8.0
	RP-86	RP-192936	0204	1	F	Use of splitSRB-WithOneUL-Path capability (38.306)	15.8.0
	RP-86	RP-192935	0205	-	F	Correction to pdsch-RepetitionMultiSlots and pusch-RepetitionMultiSlots	15.8.0
	RP-86	RP-192937	0215	1	F	Correction on initial BWP bandwidth capabilities	15.8.0
	RP-86	RP-192937	0216	1	F	NE-DC dynamic power sharing capability	15.8.0
	RP-86	RP-192935	0219	-	F	Clarification on crossCarrierScheduling-OtherSCS in R15	15.8.0
	RP-86	RP-192937	0220	-	F	Correction on ambiguity of UE FDD/TDD FR1/FR2 capabilities	15.8.0
03/2020	RP-87	RP-200334	0194	2	F	Correction on parameter description of beamManagementSSB-CSI-RS	15.9.0
	RP-87	RP-200335	0208	3	F	CR on BWCS for inter-ENDC BC with intra-ENDC BC (38.306)	15.9.0
	RP-87	RP-200335	0209	5	F	CR to 38.306 on support of 70MHz channel bandwidth	15.9.0
	RP-87	RP-200334	0236	-	F	Correction on SRB capability in NR-DC	15.9.0
	RP-87	RP-200335	0248	2	F	Data rate for the case of single carrier standalone operation	15.9.0
	RP-87	RP-200334	0254	1	F	CR on the maximum stored number of deprioritisation frequencies	15.9.0
	RP-87	RP-200335	0255	2	F	Miscellaneous Corrections to UE capability parameters	15.9.0
	RP-87	RP-200335	0259	1	F	UE capability of intra-band requirements for inter-band EN-DC/NE-DC	15.9.0
07/2020	RP-88	RP-201161	0176	7	F	Default values for UE capability	15.10.0
	RP-88	RP-201163	0262	3	F	Corrections on the number of DRBs	15.10.0
	RP-88	RP-201159	0264	1	F	Clarification on supported NR-DC cell grouping	15.10.0
	RP-88	RP-201163	0287	2	F	Correction to the serving cell number for ENDC power class	15.10.0
	RP-88	RP-201160	0294	1	F	SRS Capability report for SRS only Scell	15.10.0
	RP-88	RP-201159	0298	-	F	Clarification on L1 feature of NGEN-DC and NE-DC	15.10.0
	RP-88	RP-201162	0300	1	F	Clarification on L2 and RAN4 feature of NGEN-DC and NE-DC	15.10.0
	RP-88	RP-201163	0303	1	F	Correction on UE capabilities with xDD and FRx differentiations	15.10.0
	RP-88	RP-201163	0311	1	F	Invalidating bandwidth class F for FR1	15.10.0
	RP-88	RP-201162	0317	1	F	Missing "Optional features without UE radio access capability parameters"	15.10.0
	RP-88	RP-201163	0319	1	F	Missing UE capability requirements	15.10.0
	RP-88	RP-201164	0325	2	F	Correction on UE capability constraints	15.10.0
	RP-88	RP-201160	0332	-	F	on the capability of Basic CSI feedback (2-32)	15.10.0
	RP-88	RP-201162	0338	1	F	Clarification on the support of IMS voice over split bearer for NR-DC and NE-DC	15.10.0
	RP-88	RP-201161	0342	1	F	Clarification on maximum number of supported PDSCH Resource Element mapping patterns	15.10.0
	RP-88	RP-201164	0345	2	F	Introduction of CGI reporting capabilities	15.10.0
	RP-88	RP-201161	0347	1	F	UE Capability Enhancement for FR1(TDD/FDD) / FR2 CA and DC	15.10.0
	RP-88	RP-201161	0352	-	F	CR on unnecessary XDD FRX differentiation	15.10.0
	RP-88	RP-201162	0354	-	F	Clarification to maxUplinkDutyCycle-FR2	15.10.0
	RP-88	RP-201163	0359	1	F	Correction on UE capability signalling for simultaneous SRS antenna and carrier switching	15.10.0

	RP-88	RP-201187	0361	-	B	CR on introduction of BCS to asymmetric channel bandwidths (38.306)	15.10.0
09/2020	RP-89	RP-201938	0377	1	F	Corrections on UE capability constraints	15.11.0
	RP-89	RP-201937	0386	1	F	Clarification on PDSCH rate-matching capabilities	15.11.0
	RP-89	RP-201937	0388	2	F	Corrections on the capabilities associated with multiple bands/Cells	15.11.0
	RP-89	RP-201938	0403	2	F	Clarification on the extended capability of NGEN-DC	15.11.0
12/2020	RP-90	RP-202790	0418	2	F	CR to clarify UE capability in case of Cross-Carrier operation	15.12.0
	RP-90	RP-202789	0438	1	F	Clarification on the inter-frequency handover capability	15.12.0
	RP-90	RP-202789	0440	-	F	Clarification on NE-DC for bandwidth combination set	15.12.0
	RP-90	RP-202790	0452	1	F	Removing contradiction on number of FSpUCC and FSpDCC	15.12.0
	RP-90	RP-202789	0460	-	F	Clarification on UE capabilities with FDD/TDD differentiation	15.12.0
	RP-90	RP-202790	0475	-	F	Dummify UE capability of crossCarrierScheduling-OtherSCS	15.12.0
	RP-90	RP-202789	0478	1	F	Clarification for multipleCORESET	15.12.0
	RP-90	RP-202881	0480	-	F	CR to 38.306 on handling of fallbacks for FR2 CA	15.12.0