3GPP TR 38.717-04-01 V0.1.0 (2020-08)

Technical Report

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
NR inter-band Carrier Aggregation for 4 bands DL with 1 band UL
(Release 17)

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

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.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document is a technical report on inter-band CA for 4 bands DL with 1 band UL under Rel-17 time frame. The purpose is to gather the relevant background information and studies in order to address 4 bands DL/1 band UL Inter-band Carrier Aggregation requirements for the Rel-17 band combinations in Table 1-1.

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] RP-200665, “New WID: NR inter-band CA for 4 bands DL with 1 band UL”, RAN#88-e

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in 3GPP 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 3GPP TR 21.905 [1].

example: text used to clarify abstract rules by applying them literally.

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

<ABBREVIATION> <Expansion>

4 Background

The present document is a technical report for 4 bands DL/1 band UL Inter-band Carrier Aggregation under Rel-17 timeframe. The document covers each band combination specific issues (i.e. one sub-clause defined per band combination)

4.1 TR maintenance

A single company is responsible for introducing all approved TPs in the current TR, i.e. TR editor. However, it is the responsibility of the contact person of each band combination to ensure that the TPs related to the band combination have been implemented.

5 4 Band Carrier Aggregation with Single UL: Specific Band Combination Par

<Editor's note: The requirements for specific band combinations shall be described according to the same manner as specified in TS38.101-3.>

5.1 CA_n3-n28-n41-n78

5.1.1 Operating bands for CA

Table 5.1.1-1: 4DL Inter-band CA operating bands

NR CA Band	NR Band	Uplink (UL) operating band			Downlink (DL) operating band			Duplex Mode
		BS receive / UE transmit			BS transmit / UE receive			
		F_{UL_low} – F_{UL_high}			F_{DL_low} – F_{DL_high}			
CA_n3-n28-n41-n78	n3	1710 MHz	-	1785 MHz	1805 MHz	-	1880 MHz	FDD
	n28	703 MHz	-	748 MHz	758 MHz	-	803 MHz	FDD
	n41	2496 MHz	-	2690 MHz	2496 MHz	-	2690 MHz	TDD
	n78	3300 MHz	-	3800 MHz	3300 MHz	-	3800 MHz	TDD

5.1.2 Channel bandwidths per operating band for CA

Table 5.1.2-1: Supported channel bandwidths per CA configuration for 4DL inter-band CA

NR CA Configuration	UL Config	NR Band	SCS [kHz]	5	10	15	20	25	30	40	50	60	80	100	Bandwidth combination set
CA_n3A-n28A-n41A-n78A	-	n3	15	Yes	Yes	Yes	Yes	Yes	Yes	Yes					0
			30		Yes	Yes	Yes	Yes	Yes	Yes					
			60		Yes	Yes	Yes	Yes	Yes	Yes					
		n28	15	Yes	Yes	Yes	Yes		Yes						
			30		Yes	Yes	Yes		Yes						
			60												
		n41	15		Yes	Yes	Yes		Yes	Yes	Yes				
			30		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	
			60		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	
		n78	15		Yes	Yes	Yes		Yes	Yes	Yes				
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

NOTE: For the UE that signals support of any bandwidth combination set for carrier aggregation, the UE shall support all single carrier bandwidths for the constituent bands as defined in Table 5.3.5-1 of TS 38.101-1 [3] and in Table 5.3.5-1 of TS 38.101-2 when operating in single carrier mode.

5.1.3 $\Delta T_{IB,c}$ and $\Delta R_{IB,c}$ values

For four DLs of Band n3, n28, n41and n78, the same $\Delta T_{IB,c}$ and $\Delta R_{IB,c}$ values specified for DC_3-28-41_n78 are used as below..

Table 5.1.3-1: ΔTIB,c for 4DL aggregation

Inter-band CA Configuration	NR Band	ΔTIB,c [dB]
CA_n3-n28-n41-n78	n3	1
	n28	0.5
	n41	0.3[1]/0.8[2]
	n78	0.8
NOTE 1: Applicable for the frequency range of 2515-2690 MHz. NOTE 2: Applicable for the frequency range of 2496-2515 MHz.		

Table 5.1.3-2: ΔRIB,c for 4DL aggregation

Inter-band CA Configuration	NR Band	ΔRIB,c [dB]
CA_n3-n28-n41-n78	n3	0.5
	n28	0.2
	n41	0[1]/0.5[2]
	n78	0.5
NOTE 1: Applicable for the frequency range of 2515-2690 MHz. NOTE 2: Applicable for the frequency range of 2496-2515 MHz		

5.1.4 REFSENS requirements

There are no additional MSD requirements for this band combination.

5.2 CA_n25-n41-n66-n71

5.2.1 Channel bandwidths per operating bands for CA

Table 5.2.2-1: Supported channel bandwidths per CA configuration for 4DL inter-band CA

NR CA Configuration	UL Config	NR Band	SCS [kHz]	5	10	15	20	25	30	40	50	60	70	80	90	100	BCS
CA_n25A-n41A-n66A-n71A	-	n25	15	Yes	Yes	Yes	Yes										0
			30		Yes	Yes	Yes										
			60		Yes	Yes	Yes										
		n41	15		Yes	Yes	Yes		Yes	Yes	Yes						
			30		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	
			60		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	
		n66	15	Yes	Yes	Yes	Yes			Yes							
			30		Yes	Yes	Yes			Yes							
			60		Yes	Yes	Yes			Yes							
		n71	15	Yes	Yes	Yes	Yes										
			30		Yes	Yes	Yes										
			60														
CA_n25A-n41(2A)-n66A-n71A	-	n25	15	Yes	Yes	Yes	Yes										0
			30		Yes	Yes	Yes										
			60		Yes	Yes	Yes										
		n41	See CA_n41(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1														
		n66	15	Yes	Yes	Yes	Yes			Yes							
			30		Yes	Yes	Yes			Yes							
			60		Yes	Yes	Yes			Yes							
		n71	15	Yes	Yes	Yes	Yes										

			30		Yes	Yes	Yes										
			60														
CA_n25A-n41C-n66A-n71A	-	n25	15	Yes	Yes	Yes	Yes										0
			30		Yes	Yes	Yes										
			60		Yes	Yes	Yes										
		n41	See CA_n41C Bandwidth Combination Set 0 in Table 5.5A.1-1														
		n66	15	Yes	Yes	Yes	Yes			Yes							
			30		Yes	Yes	Yes			Yes							
			60		Yes	Yes	Yes			Yes							
		n71	15	Yes	Yes	Yes	Yes										
			30		Yes	Yes	Yes										
			60														

5.2.2 $\Delta T_{IB,c}$ and $\Delta R_{IB,c}$ values

For CA_n25-n41-n66-n71 the $\Delta T_{IB,c}$ and $\Delta R_{IB,c}$ values are shown in table 5.2.2-1 and table 5.2.2-2, respectively. Values are derived from DC_2-7-66_n71.

Table 5.2.2-1: ΔTIB,c for 4DL aggregation

Inter-band CA Configuration	NR Band	$\Delta T_{IB,c}$ [dB]
CA_n25-n41-n66-n71	n25	0.5
	n41	0.5
	n66	0.5
	n71	0.3

Table 5.2.2-2: ΔRIB,c for 4DL aggregation

Inter-band CA Configuration	NR Band	$\Delta R_{IB,c}$ [dB]
CA_n25-n41-n66-n71	n25	0.3
	n41	0.5
	n66	0.5

5.2.3 REFSENS requirements

MSD requirements are captured in lower order combinations.

Annex A - Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2020-08	3GPP RAN4#96-e	R4-2010682				TR skeleton	0.0.1
2020-08	3GPP RAN4#96-e	R4-2011887				Implemented TP's from RAN4 #96-e: R4-2010254, "TP for TR 38.717-04-01 CA_n3A-n28A-n41A-n78A", Samsung, KDDI R4-2011676, "TP to add CA_n25A-n41A-n66A-n71A, CA_n25A-n41(2A)-n66A-n71A, CA_n25A-n41C-n66A-n71A", Ericsson, T-Mobile US	0.1.0