# 3GPP TR 38.717-05-01 V0.1.0 (2020-08)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; NR inter-band CA for 5 bands DL with x bands UL (x=1, 2) (Release 17)





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#### 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

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#### **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 5 bands DL with x bands UL (x=1, 2) under Rel-17 time frame. The purpose is to gather the relevant background information and studies in order to address 5 bands DL/x bands UL (x=1, 2) Inter-band Carrier Aggregation requirements for the Rel-17 band combinations in Table 1-1 and Table 1-2.

Table 1-1: Release 17 5 bands DL/ x bands UL (x=1, 2) inter-band carrier aggregation combinations involving FR1

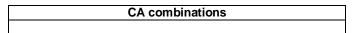
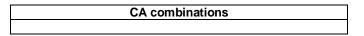


Table 1-2: Release 17 5 bands DL/ x bands UL (x=1, 2) inter-band carrier aggregation combinations between FR1 and FR2



This TR contains a general part and specific band combination part. The actual requirements are added to the corresponding technical specifications.

### 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-201026, " New WID on Rel-17 Band combinations for SA NR Supplementary uplink (SUL), NSA NR SUL, NSA NR SUL with UL sharing from the UE perspective (ULSUP)", RAN#88

# 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>

 $\Delta R_{IB,c}$  Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving

cell c.

ΔT<sub>IB,c</sub> Allowed maximum configured output power relaxation due to support for inter-band CA

operation, for serving cell c.

#### 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> Base Station

BCS Bandwidth Combination Set

CA Carrier Aggregation
CC Component Carriers
DC Dual Connectivity

DL Downlink

E-UTRA Evolved UMTS Terrestrial Radio Access

FDD Frequency Division Duplex

MPR Allowed maximum power reduction
MSD Maximum Sensitivity Degradation

NR New Radio

REFSENS Reference Sensitivity power level

SCS Subcarrier spacing
TDD Time Division Duplex
UE User Equipment

UL Uplink

# 4 Background

The present document is a technical report for 4 bands DL/ x bands UL (x=1, 2) 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/band combination to ensure that the TPs related to the band/band combination have been implemented.

# 5 Five bands inter-band CA involving FR1

# 5.Y CA\_nX-nY-nZ-nW-nV

### 5.Y.1 Operating bands for CA

Table 5.Y.1-1: Inter-band CA operating bands of CA\_nX-nY-nZ-nW-nV

	Uplink (UL) band	Downlink (DL) band	Duplex
NR Band	BS receive / UE transmit	BS transmit / UE receive	bublex mode
	Ful_low - Ful_high	F <sub>DL_low</sub> - F <sub>DL_high</sub>	mode
nX	_	_	
nY	_	_	
nΖ	_	-	
nW	_	<del>-</del>	
nV	_	-	

# 5.Y.2 Configurations for inter-band CA

Table 5.Y.2-1: Supported channel bandwidths per CA configuration for CA\_nX-nY-nZ-nW-nV

NR CA Configuration	UL Config	NR Band	SCS [kHz]	5	10	15	20	25	30	40	50	60	70	80	90	100	Bandwidth combination set		
			15																
		nX	30																
			60																
			15														1		
	-	nY	30																
			60																
CA_nX-nY-nZ-		nZ	15														0		
nW-nV			30														0		
n w-n v			60																
			15																
		nW	30																
			60																
			15																
		nV	30																
					60														

#### 5.Y.3 $\Delta T_{IB}$ and $\Delta R_{IB}$ values

For CA\_nX-nY-nZ-nW-nV , the  $\Delta T_{IB,c}$  and  $\Delta R_{IB,c}$  values are given in the tables below.

Table 5.Y.3-1: ∆T<sub>IB,c</sub>

Inter-band CA Configuration	NR Band	ΔT <sub>IB,c</sub> [dB]
	nX	
CA nV nV n7	nY	
CA_nX-nY-nZ- nW-nV	nΖ	
1100-110	nW	
	n\/	

Table 5.Y.3-2: △R<sub>IB,c</sub>

Inter-band CA Configuration	NR Band	ΔR <sub>IB,c</sub> [dB]
	nX	
CA nV nV n7	nY	
CA_nX-nY-nZ- nW-nV	nΖ	
1100-110	nW	
	nV	

# 6 Five bands inter-band CA between FR1 and FR2

# 6.Y CA\_nX-nY-nZ-nW-nV

### 6.Y.1 Operating bands for CA

Table 6.Y.1-1: Inter-band CA operating bands of CA\_nX-nY-nZ-nW-nV

	Uplink (UL) band	Downlink (DL) band	Dunley
NR Band	BS receive / UE transmit	BS transmit / UE receive	<ul><li>Duplex</li><li>mode</li></ul>
	F <sub>UL_low</sub> - F <sub>UL_high</sub>	F <sub>DL_low</sub> - F <sub>DL_high</sub>	mode
nX	_	_	
nY	_	_	
nΖ	-	-	
nW	-	_	
nV	_	-	

# 6.Y.2 Configurations for inter-band CA

Table 6.Y.2-1: Supported channel bandwidths per CA configuration for CA\_nX-nY-nZ-nW-nV

NR CA Configuration	UL Config	NR Band	SCS [kHz]	5	10	15	20	25	30	40	50	60	80	90	100	200	400	Bandwidth combination set
			15															
		nX	30															
			60															
		nY	15															0
			30															
			60															
CA_nX-nY-nZ-	-		15															
nW-nV		nΖ	30															
			60															
			15															
		nW	30															
			60															
		nV	60															
		IIV	120															

# Annex A (informative): Change history

	Change history										
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version				
2020-08	3GPP RAN4#9 6-e	R4-2011228				Initial TR skeleton	0.0.1				
2020-08	3GPP RAN4#9 6-e	R4-2011229				TR 38.717-05-01	0.1.0				