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| 3GPP TR 38.717-04-02 V0.3.0 (2021-02) | |
| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Radio Access Networks;  NR inter-band Carrier Aggregation / Dual Connectivity;  for DL 4 bands and 2 UL bands;  (Release 17) | |
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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 for NR inter-band Carrier Aggregation (CA) and/or Dual Connectivity (EN-DC) of 4DL NR bands and 2UL NR bands under Rel-17 time frame. The purpose is to gather the relevant background information and studies in order to address NR inter-band CA and/or DC for the Rel-17 band combinations in Table 1-1.

This TR contains a band specific 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] 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”

# 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].

Definition format (Normal)

**<defined term>:** <definition>.

**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 format (EW)

<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 format (EW)

<ABBREVIATION> <Expansion>

# 4 Background

The present document is a technical report for NR inter-band Carrier Aggregation (CA) and/or Dual Connectivity (EN-DC) of 4 NR bands and 2 NR bands under Rel-17 time frame. 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 DL bands inter-band Carrier Aggregation with 2 UL bands: Specific Band Combination Part

## 5.1 Inter-band CA within FR1

### 5.1.1 CA\_n3-n28-n41-n77

#### 5.1.1.1 Operating bands for CA

Table 5.1.1.1-1: Inter-band CA operating bands of CA\_n3-n28-n41-n77

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| CA\_n3-n28-n41-n77 | n3, n28, n41, n77 |

#### 5.1.1.2 Channel bandwidths per operating bands for CA

Table 5.1.1.2-1: Supported channel bandwidths per CA configuration for 4DL/2UL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n3A-n28A-n41A-n77A | CA\_n3A-n28A  CA\_n3A-n41A  CA\_n3A-n77A  CA\_n28A-n41A  CA\_n28A-n77A  CA\_n41A-n77A | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |

### 5.1.2 CA\_n3-n28-n41-n78

#### 5.1.2.1 Operating bands for CA

Table 5.1.2.1-1: Inter-band CA operating bands of CA\_n3-n28-n41-n78

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| CA\_n3-n28-n41-n78 | n3, n28, n41, n78 |

#### 5.1.2.2 Channel bandwidths per operating bands for CA

Table 5.1.2.2-1: Supported channel bandwidths per CA configuration for 4DL/2UL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n3A-n28A-n41A-n78A | CA\_n3A-n28A  CA\_n3A-n41A  CA\_n3A-n78A  CA\_n28A-n41A  CA\_n28A-n78A  CA\_n41A-n78A | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 |  | 80 | 90 | 100 |  |  |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |

### 5.1.3 CA\_n41-n66-n71-n77

#### 5.1.3.1 Operating bands for CA

Table 5.1.3.1-1: Inter-band CA operating bands of CA\_n41-n66-n71-n77

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| CA\_n41-n66-n71-n77 | n41, n66, n71, n77 |

#### 5.1.3.1 Channel bandwidths per operating bands for CA

Table 5.1.3-1: Supported channel bandwidths per CA configuration for 4DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n41A-n66A-n71A-n77A | CA\_n41A-n66A  CA\_n66A-n71A  CA\_n71A-n77A  CA\_n41A-n71A  CA\_n66A-n77A  CA\_n41A-n77A | n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n41C-n66A-n71A-n77A | CA\_n41A-n66A CA\_n66A-n71A  CA\_n71A-n77A  CA\_n41A-n71A  CA\_n66A-n77A  CA\_n41A-n77A | n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_n41(2A)-n66A-n71A-n77A | CA\_n41A-n66A  CA\_n66A-n71A  CA\_n71A-n77A  CA\_n41A-n71A  CA\_n66A-n77A  CA\_n41A-n77A | n41 | See CA\_n41(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | 0 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

#### 5.1.3.3 UE co-existence studies

The coexistence studies have been captured into the constituent fallback modes in TR 38.716-03-02, there is no additional harmonic and intermodulation impact for the additional band receiver.

#### 5.1.3.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c  could reuse the values for CA\_n3-n28-n41-n77 with 1UL that have been captured into TR38.717-04-01.

#### 5.1.3.5 REFSENS requirements

There is no need to specify additional MSD requirement for this UL CA configuration.

### 5.1.4 CA\_n25-n41-n66-n71

#### 5.1.4.1 Operating bands for CA

Table 5.2.x.1-1: Inter-band CA operating bands of CA\_n25-n41-n66-n71

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| CA\_n25-n41-n66-n71 | n25, n41, n66, n71 |

#### 5.1.4.1 Channel bandwidths per operating bands for CA

Table 5.1.4-1: Supported channel bandwidths per CA configuration for 4DL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | Bandwidth combination set |
|  |  |  | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |
| CA\_n25A-n41A-n66A-n71A | CA\_n41A-n66A  CA\_n66A-n71A  CA\_n71A-n77A  CA\_n41A-n71A  CA\_n66A-n77A  CA\_n41A-n77A | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n41 |  | 10 | 15 | 20 |  | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n25A-n41C-n66A-n71A | CA\_n41A-n66A CA\_n66A-n71A  CA\_n71A-n77A  CA\_n41A-n71A  CA\_n66A-n77A  CA\_n41A-n77A | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n41 | See CA\_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |
| CA\_n25A-n41(2A)-n66A-n71A | CA\_n41A-n66A  CA\_n66A-n71A  CA\_n71A-n77A  CA\_n41A-n71A  CA\_n66A-n77A  CA\_n41A-n77A | n25 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n41 | See CA\_n41(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | |
| n66 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |
| n71 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |

#### 5.1.4.3 UE co-existence studies

The coexistence studies have been captured into the constituent fallback modes in TR 38.716-03-02, there is no additional harmonic and intermodulation impact for the additional band receiver.

#### 5.1.4.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c  could reuse the values for DC\_2-7-66\_n71 that have been captured into TR38.717-04-01.

#### 5.1.4.5 REFSENS requirements

There is no need to specify additional MSD requirement for this UL CA configuration.

### 5.1.x CA\_Na-Nb-Nc-Nd

#### 5.1.x.1 Operating bands for CA

Table 5.1.x.1-1: Inter-band CA operating bands of CA\_Na-Nb-Nc-Nd

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2]) |
|  |  |

#### 5.1.x.2 Channel bandwidths per operating band for CA

Table 5.1.x.2-1: Supported bandwidths per CA\_Na-Nb-Nc-Nd

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | Channel bandwidth (MHz) (NOTE 3) | | | | | | | | | | | | | **Maximum Aggregated bandwidth**  **[MHz]** | **Bandwidth combination set** |
| 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| CA\_Na-Nb-Nc-Nd | CA\_Na-Nb | Na |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nb |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nc |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nd |  |  |  |  |  |  |  |  |  |  |  |  |  |

<Editor Note: Sub-clause 5.1.x3, 5.1.x.4 and 5.1.x.5 are optional, since the study of corresponding lower-order combination can be applied>

#### 5.1.x.3 UE co-existence study

#### 5.1.x.4 ∆TIB and ∆RIB values

#### 5.1.x.5 REFSENS requirements

## 5.2 Inter-band CA including RF2

### 5.2.1 CA\_n3-n28-n77-n257

#### 5.2.1.1 Operating bands for CA

Table 5.2.1.1-1: Inter-band CA operating bands of CA\_n3-n28-n77-n257

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| CA\_n3-n28-n77-n257 | n3, n28, n77, n257 |

#### 5.2.1.2 Channel bandwidths per operating bands for CA

Table 5.2.x.2-1: Supported channel bandwidths per CA configuration for 4DL/2UL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n3A-n28A-n77A-n257A | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n77A-n257A | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n3A-n28A-n77A-n257G | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n77A-n257A  CA\_n3A-n257G  CA\_n28A-n257G  CA\_n77A-n257G | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257G BCS0 in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |
| CA\_n3A-n28A-n77A-n257H | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n77A-n257A  CA\_n3A-n257G  CA\_n28A-n257G  CA\_n77A-n257G  CA\_n3A-n257H  CA\_n28A-n257H  CA\_n77A-n257H | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257H BCS0 in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |
| CA\_n3A-n28A-n77A-n257I | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n77A-n257A  CA\_n3A-n257G  CA\_n28A-n257G  CA\_n77A-n257G  CA\_n3A-n257H  CA\_n28A-n257H  CA\_n77A-n257H  CA\_n3A-n257I  CA\_n28A-n257I  CA\_n77A-n257I | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | 0 |
| n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n257 | See CA\_n257I BCS0 in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |

#### 5.2.1.3 UE co-existence studies

The coexistence studies have been captured into the constituent fallback modes in TR 38.716-03-02, there is no additional harmonic and intermodulation impact for the additional band receiver.

#### 5.2.1.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c  could reuse the values for CA\_n3-n28-n77-n257 with 1UL that have been captured into TR38.716-04-01.

#### 5.2.1.5 REFSENS requirements

There is no need to specify additional MSD requirement for this UL CA configuration.

### 5.2.2 CA\_n3-n28-n78-n257

#### 5.2.2.1 Operating bands for CA

Table 5.2.2.1-1: Inter-band CA operating bands of CA\_n3-n28-n78-n257

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| CA\_n3-n28-n78-n257 | n3, n28, n78, n257 |

#### 5.2.2.2 Channel bandwidths per operating bands for CA

Table 5.2.2.2-1: Supported channel bandwidths per CA configuration for 4DL/2UL inter-band CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** |  | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | | **Bandwidth combination set** | |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** | |
| CA\_n3A-n28A-n78A-n257A |  | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n78A-n257A | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | | 0 | |
|  | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | |
|  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | |
|  | n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 | |
| CA\_n3A-n28A-n78A-n257G |  | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n78A-n257A  CA\_n3A-n257G  CA\_n28A-n257G  CA\_n78A-n257G | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | | 0 | |
|  | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | |
|  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | |
|  | n257 | See CA\_n257G BCS0 in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n3A-n28A-n78A-n257H |  | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n78A-n257A  CA\_n3A-n257G  CA\_n28A-n257G  CA\_n78A-n257G  CA\_n3A-n257H  CA\_n28A-n257H  CA\_n78A-n257H | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | | 0 | |
|  | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | |
|  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | |
|  | n257 | See CA\_n257H BCS0 in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | | |
| CA\_n3A-n28A-n78A-n257I |  | CA\_n3A-n257A  CA\_n28A-n257A  CA\_n78A-n257A  CA\_n3A-n257G  CA\_n28A-n257G  CA\_n78A-n257G  CA\_n3A-n257H  CA\_n28A-n257H  CA\_n78A-n257H  CA\_n3A-n257I  CA\_n28A-n257I  CA\_n78A-n257I | n3 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  |  |  | | 0 | |
|  | n28 | 5 | 10 | 15 | 20 |  | 30 |  |  |  |  |  |  |  |  |  | |
|  | n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  | |
|  | n257 | See CA\_n257I BCS0 in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |  | |

#### 5.2.2.3 UE co-existence studies

The coexistence studies have been captured into the constituent fallback modes in TR 38.716-03-02, there is no additional harmonic and intermodulation impact for the additional band receiver.

#### 5.2.2.4 ∆TIB,c and ∆RIB,c values

The ΔTIB,c and ΔRIB,c  could reuse the values for CA\_n3-n28-n78-n257 with 1UL that have been captured into TR38.716-04-01.

#### 5.2.2.5 REFSENS requirements

There is no need to specify additional MSD requirement for this UL CA configuration.

### 5.2.3 CA\_n1-n77-n79-n257

#### 5.2.3.1 Operating bands for CA

Table 5.2.3.1-1: 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** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n77-n79-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

#### 5.2.3.2 Channel bandwidths per operating band for CA

Table 5.2.3.2-1: Supported channel bandwidths per CA configuration for 4DL/2UL inter-band CA

| **NR CA config** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n1A-n77A-n79A-n257A | CA\_n1A-n77A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n77A-n79A  CA\_n77A-n257A  CA\_n79A-n257A | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n1A-n77A-n79A-n257G | CA\_n1A-n77A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n1A-n257G  CA\_n77A-n79A  CA\_n77A-n257A  CA\_n77A-n257G  CA\_n79A-n257A  CA\_n79A-n257G | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |
| CA\_n1A-n77A-n79A-n257H | CA\_n1A-n77A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n1A-n257G  CA\_n1A-n257H  CA\_n77A-n79A  CA\_n77A-n257A  CA\_n77A-n257G  CA\_n77A-n257H  CA\_n79A-n257A  CA\_n79A-n257G  CA\_n79A-n257H | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |
| CA\_n1A-n77A-n79A-n257I | CA\_n1A-n77A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n1A-n257G  CA\_n1A-n257H  CA\_n1A-n257I  CA\_n77A-n79A  CA\_n77A-n257A  CA\_n77A-n257G  CA\_n77A-n257H  CA\_n77A-n257I  CA\_n79A-n257A  CA\_n79A-n257G  CA\_n79A-n257H  CA\_n79A-n257I | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | See CA\_n257I in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |

### 5.2.4 CA\_n1-n78-n79-n257

#### 5.2.4.1 Operating bands for CA

Table 5.2.4.1-1: 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** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n1-n78-n79-n257 | n1 | 1920 MHz | – | 1980 MHz | 2110 MHz | – | 2170 MHz | FDD |
| n78 | 3300 MHz | – | 3800 MHz | 3300 MHz | – | 3800 MHz | TDD |
| n79 | 4400 MHz | – | 5000 MHz | 4400 MHz | – | 5000 MHz | TDD |
| n257 | 26500 MHz | – | 29500 MHz | 26500 MHz | – | 29500 MHz | TDD |

#### 5.2.4.2 Channel bandwidths per operating band for CA

Table 5.2.4.2-1: Supported channel bandwidths per CA configuration for 4DL/2UL inter-band CA

| **NR CA config** | **Uplink CA configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | **Bandwidth combination set** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_n1A-n78A-n79A-n257A | CA\_n1A-n78A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n78A-n79A  CA\_n78A-n257A  CA\_n79A-n257A | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 |  |  |  |  |  |  |  | 50 |  |  |  |  | 100 | 200 | 400 |
| CA\_n1A-n78A-n79A-n257G | CA\_n1A-n78A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n1A-n257G  CA\_n78A-n79A  CA\_n78A-n257A  CA\_n78A-n257G  CA\_n79A-n257A  CA\_n79A-n257G | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | See CA\_n257G in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |
| CA\_n1A-n78A-n79A-n257H | CA\_n1A-n78A  CA\_n1A-n79A  CA\_n1A-n257A  CA\_n1A-n257G  CA\_n1A-n257H  CA\_n78A-n79A  CA\_n78A-n257A  CA\_n78A-n257G  CA\_n78A-n257H  CA\_n79A-n257A  CA\_n79A-n257G  CA\_n79A-n257H | n1 | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  | 0 |
| n78 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |  |  |
| n79 |  |  |  |  |  |  | 40 | 50 | 60 |  | 80 |  | 100 |  |  |
| n257 | See CA\_n257H in Table 5.5A.1-1 in TS 38.101-2 | | | | | | | | | | | | | | |

### 5.2.x CA\_Na-Nb-Nc-Nd

#### 5.2.x.1 Operating bands for CA

Table 5.2.x.1-1: Inter-band CA operating bands of CA\_Na-Nb-Nc-Nd

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
|  |  |

#### 5.2.x.2 Channel bandwidths per operating band for CA

Table 5.2.x.2-1: Supported bandwidths per CA\_Na-Nb-Nc-Nd

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink NR CA  configuration** | **NR Band** | **Channel bandwidth (MHz) (NOTE 3)** | | | | | | | | | | | | | | | **BCS** |
| **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **200** | **400** |
| CA\_Na-Nb-Nc-Nd | CA\_Na-Nb | Na |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nb |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nc |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nd |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

<Editor Note: Sub-clause 5.2.x3, 5.2.x.4 and 5.2.x.5 are optional, since the study of corresponding lower-order combination can be applied>

#### 5.2.x.3 UE co-existence study

#### 5.2.x.4 ∆TIB and ∆RIB values

#### 5.2.x.5 REFSENS requirements

# 6 4 DL bands Dual Connectivity with 2 UL bands: Specific Band Combination Part

## 6.1 DC within FR1

### 6.1.x DC\_Na-Nb-Nc-Nd

#### 6.1.x.1 Operating bands for DC

Table 6.1.x.1-1: Inter-band DC operating bands of DC\_Na-Nb-Nc-Nd

|  |  |
| --- | --- |
| NR DC Band | NR Band  (Table 5.2-1 in TS38.101-1[2]) |
|  |  |

#### 6.1.x.2 Configuration for DC

Table 6.1.x.2-1: Inter-band DC configuration of DC\_Na-Nb-Nc-Nd

| Downlink NR DC  configuration | Uplink NR DC  configuration |
| --- | --- |
|  |  |

## 6.2 DC including RF2

### 6.2.1 DC\_n3-n28-n77-n257

#### 6.2.1.1 Operating bands for DC

Table 6.2.1.1-1: Inter-band DC operating bands of DC\_n3-n28-n77-n257

|  |  |
| --- | --- |
| NR DC Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| DC\_n3-n28-n77-n257 | n3, n28, n77, n257 |

#### 6.2.1.2 Configurations for DC

Table 6.2.1.2-1: Inter-band DC configuration of DC\_n3-n28-n77-n257

| Downlink NR DC  configuration | Uplink NR DC  configuration |
| --- | --- |
| DC\_n3A-n28A-n77A-n257A | DC\_n3A-n257A  DC\_n28A-n257A  DC\_n77A-n257A |
|
|
|
| DC\_n3A-n28A-n77A-n257G | DC\_n3A-n257A  DC\_n28A-n257A  DC\_n77A-n257A DC\_n3A-n257G DC\_n28A-n257G DC\_n77A-n257G |
| DC\_n3A-n28A-n77A-n257H | DC\_n3A-n257A DC\_n28A-n257A DC\_n77A-n257A DC\_n3A-n257G DC\_n28A-n257G DC\_n77A-n257G DC\_n3A-n257H DC\_n28A-n257H DC\_n77A-n257H |
|
|
|
|
|
| DC\_n3A-n28A-n77A-n257I | DC\_n3A-n257A DC\_n28A-n257A DC\_n77A-n257A DC\_n3A-n257G DC\_n28A-n257G DC\_n77A-n257G DC\_n3A-n257H DC\_n28A-n257H DC\_n77A-n257H DC\_n3A-n257I DC\_n28A-n257I DC\_n77A-n257I |
|
|
|
| NOTE 1: NR configuration for FR1 and FR2 are defined in TS 38.101-1 [2] and TS 38.101-2 [3] respectively. | |

### 6.2.2 DC\_n3-n28-n78-n257

#### 6.2.2.1 Operating bands for DC

Table 6.2.2.1-1: Inter-band DC operating bands of DC\_n3-n28-n78-n257

|  |  |
| --- | --- |
| NR DC Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
| DC\_n3-n28-n78-n257 | n3, n28, n78, n257 |

#### 6.2.2.2 Configurations for DC\_n3-n28-n78-n257

Table 6.2.2.2-1: Inter-band DC configuration of DC\_n3-n28-n78-n257

| Downlink NR DC  configuration | Uplink NR DC  configuration |
| --- | --- |
| DC\_n3A-n28A-n78A-n257A | DC\_n3A-n257A DC\_n28A-n257A DC\_n78A-n257A |
| DC\_n3A-n28A-n78A-n257G | DC\_n3A-n257A DC\_n28A-n257A DC\_n78A-n257A DC\_n3A-n257G DC\_n28A-n257G DC\_n78A-n257G |
| DC\_n3A-n28A-n78A-n257H | DC\_n3A-n257A DC\_n28A-n257A DC\_n78A-n257A DC\_n3A-n257G DC\_n28A-n257G DC\_n78A-n257G DC\_n3A-n257H DC\_n28A-n257H DC\_n78A-n257H |
| DC\_n3A-n28A-n78A-n257I | DC\_n3A-n257A DC\_n28A-n257A DC\_n78A-n257A DC\_n3A-n257G DC\_n28A-n257G DC\_n78A-n257G DC\_n3A-n257H DC\_n28A-n257H DC\_n78A-n257H DC\_n3A-n257I DC\_n28A-n257I DC\_n78A-n257I |
| NOTE 1: NR configuration for FR1 and FR2 are defined in TS 38.101-1 [2] and TS 38.101-2 [3] respectively. | |

### 6.2.x DC\_Na-Nb-Nc-Nd

#### 6.2.x.1 Operating bands for DC

Table 6.1.x.1-1: Inter-band DC operating bands of DC\_Na-Nb-Nc-Nd

|  |  |
| --- | --- |
| NR DC Band | NR Band  (Table 5.2-1 in TS38.101-1[2] and TS38.101-2[3]) |
|  |  |

#### 6.2.x.2 Configuration for DC

Table 6.2.x.2-1: Inter-band DC configuration of DC\_Na-Nb-Nc-Nd

| Downlink NR DC  configuration | Uplink NR DC  configuration |
| --- | --- |
|  |  |

Annex A (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **Tdoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2020-08 | RAN4#96e | R4-2010222 |  |  |  | Initial TR skeleton | 0.0.1 |
| 2020-08 | RAN4#96e | R4-2011891 |  |  |  | Updated TR to incorporate below TP approved in RAN4#96e with editorial update:  R4-2010255 TP for TR 38.717-04-02 CA\_n3-n28-n77-n257 and DC\_n3-n28-n77-n257  R4-2010256 TP for TR 38.717-04-02 CA\_n3-n28-n78-n257 and DC\_n3-n28-n78-n257 | 0.1.0 |
| 2020-11 | RAN4#97e | R4-2014380 |  |  |  | Updated TR to incorporate below TP approved in RAN4#97e with editorial update:  R4-2014119 TP for TR 38.717-04-02 CA\_n3-n28-n41-n77  R4-2014120 TP for TR 38.717-04-02 CA\_n3-n28-n41-n78  R4-2014818 TP for CA\_n1-n77-n79-n257 4DL/2UL for TR38.717-04-02  R4-2014819 TP for CA\_n1-n78-n79-n257 4DL/2UL for TR38.717-04-02 | 0.2.0 |
| 2021-02 | RAN4#98e | R4-2101482 |  |  |  | Simplified the format of the tables to remove the individual SCS values in the BCS tables according to approved CRs in R4-2016937 through R4-2016939 also referring to 38.101-3 v17.0.0,  Updated TR to incorporate below TP approved in RAN4#98e with editorial update:  R4-2100971 TP for TR 38.717-04-02 CA\_n3-n28-n41-n77  R4-2100972 TP for TR 38.717-04-02 CA\_n3-n28-n41-n78  R4-2101905 TP for TR 38.717-04-02 to include CA\_n41-n66-n71-n77  R4-2101906 TP for TR 38.717-04-02 to include CA\_n25-n41-n66-n71 | 0.3.0 |