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Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Radio Access Network;

NR;

Requirements on User Equipments (UEs)

supporting a release-independent frequency band

(Release 15)

** 

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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 Specification 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.

# 1 Scope

The present document specifies requirements for Rel-15 UEs supporting release independent features like:

- additional NR operating bands and power classes on top of Rel-15 of TS 38.101 [2-5] and TS 38.133 [6];

# 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 38.101-4: NR; User Equipment (UE) radio transmission and reception; Part 4: UE performance requirements

[6] 3GPP TS 38.133: NR; Requirements for support of radio resource management

[7] 3GPP TS 38.306: NR; User Equipment (UE) radio access capabilities

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions 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].

**release independent**: applicable to some frozen releases, starting from a certain release Rel-M

NOTE 1: Normally, a feature is introduced only in the latest open release Rel-N and future releases are based on the previous one so that future releases inherit the requirements of this feature. Introducing a feature "in a release independent way from Rel-M onwards" (M<N) means it was decided by TSG RAN that this feature would be also beneficial in previous, already frozen releases starting with Rel-M until Rel-(N-1). In order to avoid touching TS 38.101 [2-5] or TS 38.133 [6] of these frozen releases, the corresponding requirements are captured in TS 38.307 via pointers to [2-5] or [6] of the release in which the feature was introduced.

NOTE 2: Release independent does not mean applicable to all releases.

## 3.2 Symbols

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

N Release in which a feature is introduced into TS 38.101 [2-5] or TS 38.133 [6]

M Release from which onwards (including release M) a feature is release independent

## 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].

BW Bandwidth

CA Carrier Aggregation

CC Component carrier

DL Downlink

EN-DC Dual connectivity between E-UTRA and NR

FDD Frequency Division Duplex

FR1 Frequency range 1

FR2 Frequency range 2

SUL Supplementary uplink

TDD Time Division Duplex

UE User Equipment

UL Uplink

# 4 General

TSG-RAN has agreed for certain features (see the following clauses) to introduce them in a "release independent way".

This means for each feature:

- it is "introduced" in a release N, i.e. TS 38.101 [2-5] and TS 38.133 [6] of release N define certain UE requirements for this feature; the feature is indicated in the tables of the following clauses;

- it is "release independent" starting from a release M (M<N); M for the given feature is provided in the tables of the following clauses;

- UEs supporting this feature have to fulfil additional requirements in release M or higher which are specified in one or more Annexes of TS 38.307 of release N; the applicable Annexes for a given feature are provided in the tables of the following clauses.

The applicable UE Categories are specified in TS 38.306 [7] according to the release to which the UE conforms.

# 5 Release independent features for NR frequency range 1

## 5.1 Additional NR operating bands and UE power classes for NR range 1

Requirements for a Rel-15 UE for additional NR operating bands and power classes compared to TS 38.101-1 of Rel-15 [2] are introduced via this clause.

Table 5.1-1: NR operating bands

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Duplex-mode | Release  independent from | Requirements to be fulfilled  (see TS 38.307 of the release in which the band was introduced) |
| Operating bands | FDD, TDD, SUL | Rel-15 |  |

Table 5.1-2: NR UE power class

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Duplex-mode | Release  independent from | Requirements to be fulfilled  (see TS 38.307 of the release in which the band was introduced) |
| Power Class 2, 3 | FDD, TDD, SUL | Rel-15 |  |

## 5.2 Additional NR CA configurations for NR range 1

### 5.2.1 Intraband CA

Requirements for a Rel-15 UE for additional NR intraband CA configurations within FR1 compared to TS 38.101-1 of Rel-15 [2] are introduced via this clause.

Table 5.2.1-1: NR intraband CA within FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Feature** | **DL/UL** | **CA BW Class** | **Duplex-mode** | **Release**  **independent from** | **requirements to be fulfilled**  **(see 36.307 of the REL in which the CA configuration was introduced)** |
| Intra-band contiguous CA configurations within FR1 | DL | C | TDD | Rel-15 |  |
| UL |  |  |  |  |

### 5.2.2 Interband CA

Requirements for a Rel-15 UE for additional NR interband CA configurations within FR1 compared to TS 38.101-1 of Rel-15 [2] are introduced via this clause.

Table 5.2.2-1: NR interband CA within FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of bands | number of CCs | CA BW Classes | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 38.307 of the REL in which the CA configuration was introduced) |
| Inter-band CA configurations within NR FR1 | DL | 2 | 2 | A, | TDD | Rel-15 |  |
| UL | 2 | 2 | A | TDD | Rel-15 |  |

## 5.3 Additional NR SUL configurations for NR range 1

Requirements for a Rel-15 UE for additional NR SUL configurations within FR1 compared to TS 38.101-1 of Rel-15 [2] are introduced via this clause.

Table 5.3-1: NR SUL within FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of bands | number of CCs | CA BW Classes | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 38.307 of the REL in which the CA configuration was introduced) |
| Inter-band CA configurations within NR FR1 | DL | 1 | 1 | A, | SUL | Rel-15 |  |
| UL | 1 | 1 | A | SUL | Rel-15 |  |

# 6 Release independent features for NR frequency range 2

## 6.1 Additional NR operating bands and UE power classes for NR range 2

Requirements for a Rel-15 UE for additional NR operating bands and power classes compared to TS 38.101-2 of Rel-15 [3] are introduced via this clause.

Table 6.1-1: NR operating bands

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Duplex-mode | Release  independent from | Requirements to be fulfilled  (see TS 38.307 of the release in which the band was introduced) |
| Operating bands | TDD | Rel-15 |  |

Table 6.1-2: NR UE power class

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Duplex-mode | Release  independent from | Requirements to be fulfilled  (see TS 38.307 of the release in which the band was introduced) |
| [Power Class] |  | Rel-15 |  |

## 6.2 Additional NR CA configurations for NR range 2

### 6.2.1 Intraband CA

Requirements for a Rel-15 UE for additional NR intraband CA configurations within FR2 compared to TS 38.101-2 of Rel-15 [3] are introduced via this clause.

Table 6.2.1-1: NR intraband CA within FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Feature** | **DL/UL** | **CA BW Class** | **Duplex-mode** | **Release**  **independent from** | **requirements to be fulfilled**  **(see 38.307 of the REL in which the CA configuration was introduced)** |
| Intra-band contiguous CA configurations for FR2 | DL | B | TDD | Rel-15 |  |
| D |
| E |
| F |
| G |
| H |
| I |
| J |
| K |
| L |
| M |
| UL |  |  |  |  |
|  |  |  |  |

# 7 Release independent features for NR interworking between NR frequency range 1 and NR frequency range 2

## 7.1 Additional NR interband CA configurations between FR1 and FR2

Requirements for a Rel-15 UE for additional NR interband CA configurations between FR1 and FR2 compared to TS 38.101-3 of Rel-15 [4] are introduced via this clause.

Table 7.1-1: NR interband CA between FR1 and FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of bands | number of CCs | CA BW Classes | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 38.307 of the REL in which the CA configuration was introduced) |
| Inter-band CA configurations for NR interworking between FR1 and FR2 | DL | 2 | 2 | A, | TDD | Rel-15 |  |
| UL |  |  |  |  |  |  |

# 8 Release independent features for NR interworking between NR and E-UTRA

## 8.1 Additional EN-DC configurations

### 8.1.1 Intraband EN-DC

Requirements for a Rel-15 UE for additional EN-DC intraband configurations within FR1 compared to TS 38.101-3 of Rel-15 [4] are introduced via this clause.

Table 8.1.1-1: EN-DC intraband configurations within FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of E-UTRA CCs | number of NR CCs | Duplex-mode | Release  independent from | **requirements to be fulfilled**  (see 38.307 of the REL in which the CA configuration was introduced) |
| intraband contiguous EN-DC | DL | 1 | 1 | FDD | Rel-15 |  |
| UL | 1 | 1 | FDD | Rel-15 |  |
| intraband non-contiguous EN-DC | DL | 1 | 1 | TDD | Rel-15 |  |
| UL | 1 | 1 | TDD | Rel-15 |  |

### 8.1.2 Interband EN-DC

#### 8.1.2.1 Interband EN-DC within FR1

Requirements for a Rel-15 UE for additional EN-DC interband configurations within FR1 compared to TS 38.101-3 of Rel-15 [4] are introduced via this clause.

Table 8.1.2.1-1: EN-DC interband configurations without SUL within FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of E-UTRA bands | maximum number of E-UTRA CCs | number of NR bands | maximum number of NR CCs | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 38.307 of the REL in which the CA configuration was introduced) |
| Interband EN-DC | DL | 1-4 | 4 | 1 | 1 | FDD, TDD,  FDD and TDD | Rel-15 |  |
| UL | 1 | 2 | 1 | 1 | FDD, TDD, FDD and TDD | Rel-15 |  |

Table 8.1.2.1-2: EN-DC interband configurations with SUL within FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of E-UTRA bands | maximum number of E-UTRA CCs | number of NR bands | maximum number of NR CCs | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 38.307 of the REL in which the CA configuration was introduced) |
| Interband EN-DC | DL | 1-4 | 4 | 1 | 1 | FDD, TDD, SUL,  FDD and TDD | Rel-15 |  |
| UL | 1 | 1 | 2 | 2 | FDD, TDD, SUL,  FDD and TDD | Rel-15 |  |

#### 8.1.2.2 Interband EN-DC including FR2

Requirements for a Rel-15 UE for additional EN-DC interband configurations including FR2 compared to TS 38.101-3 of Rel-15 [4] are introduced via this clause.

Table 8.1.2.2-1: EN-DC interband configurations including FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of E-UTRA bands | maximum number of E-UTRA CCs | number of NR bands | maximum number of NR CCs | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 38.307 of the REL in which the CA configuration was introduced) |
| Interband EN-DC | DL | 1-4 | 4 | 1 | 1 | TDD, FDD and TDD | Rel-15 |  |
| UL | 1 | 2 | 1 | 1 | TDD, FDD and TDD | Rel-15 |  |

Annex A (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2017-09 | RAN4#85 | R4-1712166 |  |  |  | Skeleton TS | 0.0.1 |
| 2018-03 | RAN4#86 | R4-1802107 |  |  |  | TS 38.307 v0.1.0 | 0.1.0 |
| 2018-06 | RAN#80 | RP-180988 |  |  |  | v1.0.0 submitted for plenary approval | 1.0.0 |
| 2018-06 | RAN#80 |  |  |  |  | Approved by plenary – Rel-15 spec under change control | 15.0.0 |