# 3GPP TS 38.307 V15.6.0 (2020-06)

*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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# Contents

# 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.

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 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 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].

**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 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].

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
NR New radio
REL Release
SDL Supplementary downlink
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 frequency 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, SDL, 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 power class was introduced) |
|---|---|---|---|
| Power Class 1 | FDD | Rel-15 | |
| Power Class 2 | TDD | Rel-15 | |
| Power Class 3 | FDD, TDD, SUL | Rel-15 | |

# 5.2 Additional NR CA configurations for NR frequency 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 38.307 of the REL in which the CA configuration was introduced) |
|---|---|---|---|---|---|
| Intra-band contiguous CA configurations within FR1 | DL | C, D, E, F, G, H, I, J, K, L | TDD | Rel-15 | |
| | UL | A | TDD | Rel-15 | |

## 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 | Maximum 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, FDD, SDL and TDD | Rel-15 | |
| | UL | 2 | 2 | A | TDD, FDD and TDD | Rel-15 | |

## 5.3 Additional NR SUL configurations for NR frequency 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 SUL configuration was introduced) |
|---|---|---|---|---|---|---|---|
| Inter-band SUL configurations within NR FR1 | DL | 1 | 1 | A | TDD | Rel-15 | |
| | UL | 2 | 2 | A | TDD and SUL | Rel-15 | |

# 6 Release independent features for NR frequency range 2

## 6.1 Additional NR operating bands and UE power classes for NR frequency 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 1, 2, 3, 4 | TDD | Rel-15 | |

## 6.2 Additional NR CA configurations for NR frequency 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 contiguous 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 within FR2 | DL | B, C, D, E, F, G, H, I, J, K, L, M, O, P, Q | TDD | Rel-15 | |
| | UL | B, D, E, F, G, H, I, J, K, L, M, O, P, Q | TDD | Rel-15 | |

**Table 6.2.1-2: NR non-contiguous intraband CA within FR2**

| Feature | DL/UL | number of sub-blocks | maximum number of CCs within a sub-block | Duplex-mode | Release independent from | requirements to be fulfilled (see 38.307 of the REL in which the CA configuration was introduced) |
|---|---|---|---|---|---|---|
| Intra-band non-contiguous CA configurations within FR2 | DL | 2 | 4 | TDD | Rel-15 | |
| | | 3 | 1 | TDD | Rel-15 | |
| | | 4 | 1 | TDD | Rel-15 | |

# 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 frequency range 1 and frequency range 2

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 | maximum 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 FR1 | 1 | 2 | A, C | FDD, TDD | Rel-15 | |
| | DL FR2 | 1 | 4 | A, D, E, F | TDD | Rel-15 | |
| | UL FR1 | 1 | 1 | A | FDD, TDD | Rel-15 | |
| | UL FR2 | 1 | 1 | A | TDD | Rel-15 | |

## 7.2 Additional Inter-band NR-DC configurations between frequency range 1 and frequency range 2

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

**Table 7.2-1: Inter-band NR-DC between FR1 and FR2**

| Feature | DL/UL | number of bands | maximum 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 DC configurations for NR interworking between FR1 and FR2 | DL FR1 | 1 | 2 | A, C | TDD | Rel-15 | |
| | DL FR2 | 1 | 8 | A, D, E, F, G, H, I, J, K, L, M | TDD | Rel-15 | |
| | UL FR1 | 1 | 1 | A | TDD | Rel-15 | |
| | UL FR2 | 1 | 1 | A | TDD | Rel-15 | |

# 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 8.1.1-0: EN-DC intraband 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) |
|---|---|---|---|
| Intraband contiguous EN-DC power class 2 | TDD | Rel-15 | |
| Intraband contiguous EN-DC power class 3 | FDD, TDD | Rel-15 | |
| Intraband non-contiguous EN-DC power class 2 | TDD | Rel-15 | |
| Intraband non-contiguous EN-DC power class 3 | FDD, TDD | Rel-15 | |

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

| Feature | DL/UL | maximum number of E-UTRA CCs | 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) |
|---|---|---|---|---|---|---|
| intraband contiguous EN-DC | DL | 3 | 1 | FDD, TDD | Rel-15 | |
| | UL | 1 | 1 | FDD, TDD | Rel-15 | |

**Table 8.1.1-2: EN-DC non-contiguous intraband configurations within FR1**

| Feature | DL/UL | maximum number of sub-blocks | maximum number of E-UTRA CCs | 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) |
|---|---|---|---|---|---|---|---|
| intraband non-contiguous EN-DC | DL | 2 | 3 | 1 | FDD, TDD | Rel-15 | |
| | UL | 2 | 1 | 1 | FDD, TDD | Rel-15 | |

## 8.1.2 Interband EN-DC

### 8.1.2.1 Interband EN-DC within frequency range 1

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 8.1.2.1-0: EN-DC interband 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) |
|---|---|---|---|
| Interband EN-DC Power Class 2 | TDD | Rel-15 | Table B.4.6-1 |
| Interband EN-DC Power Class 3 | FDD, TDD | Rel-15 | |

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

| Feature | DL/UL | maximum number of E-UTRA bands | maximum number of E-UTRA CCs | maximum 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 | 4 | 5 | 2 | 2 | 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 | maximum number of E-UTRA bands | maximum number of E-UTRA CCs | maximum 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 | 2 | 3 | 1 | 1 | FDD, TDD, FDD and TDD | Rel-15 | |
| | UL | 1 | 1 | 2 | 2 | FDD, TDD, FDD and TDD, FDD and TDD and SUL | Rel-15 | |

### 8.1.2.2 Interband EN-DC including frequency range 2

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 | 4 | 5 | 1 | 8 | TDD, FDD and TDD | Rel-15 | |
| | UL | 1 | 2 | 1 | 8 | TDD, FDD and TDD | Rel-15 | |

### 8.1.2.3 Interband EN-DC including frequency range 1 and frequency range 2

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

**Table 8.1.2.3-1: EN-DC interband configurations including FR1 and FR2**

| Feature | DL/UL | maximum number of E-UTRA bands | maximum number of E-UTRA CCs | maximum 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 FR1 | 4 | 4 | 1 | 2 | TDD, FDD | Rel-15 | |
| | DL FR2 | | | 1 | 4 | TDD | Rel-15 | |
| | UL FR1 | 1 | 1 | 1 | 1 | FDD, TDD | Rel-15 | |
| | UL FR2 | | | 1 | 1 | 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 |
| 2018-09 | RAN#81 | RP-181896 | 0001 | | F | CR for FR2 Power Classes in TS38.307 | 15.1.0 |
| 2018-12 | RAN#82 | RP-182362 | 0002 | 2 | B | CR for TS 38.307 | 15.2.0 |
| 2019-06 | RAN#84 | RP-191237 | 0005 | | B | Addition of missing features for TS 38.307 | 15.3.0 |
| 2019-12 | RAN#86 | RP-193019 | 0010 | | B | CR for REL-15 TS 38.307 for PC2 EN-DC TDD+TDD | 15.4.0 |
| 2019-12 | RAN#86 | RP-193036 | 0013 | | F | Adding SDL to 38.307 | 15.4.0 |
| 2020-03 | RAN#87 | RP-200404 | 0017 | 1 | B | 38.307 CR power class REL-15 | 15.5.0 |
| 2020-06 | RAN#88 | RP-200986 | 0021 | | F | Maintenance CR to 38307 on a reference spec number R15 | 15.6.0 |