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| 3GPP TS 36.307 V18.3.0 (2023-12) | |
| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Radio Access Network;  Evolved Universal Terrestrial Radio Access (E-UTRA);  Requirements on User Equipments (UEs)  Supporting a release-independent frequency band  (Release 18) | |
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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-17 UEs supporting release independent features like:

- additional E-UTRA operating frequency bands on top of Rel-17 of TS 36.101 [2] and TS 36.133 [3];

- additional E-UTRA CA configurations (intra-band/inter-band) on top of Rel-17 of TS 36.101 [2] and TS 36.133 [3];

- additional operating bands and/or CA configurations for specific features (like UE category 0, M1, NB1);

- other release independent features (like 4Rx antenna port, high speed scenario, 8Rx antenna port, NB-IoT or eMTC operation over NTN).

# 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 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) Radio Transmission and Reception".

NOTE: The considered release is given in the text of the present document that uses TS 36.101 [2].

[3] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for Support of Radio Resource Management".

NOTE: The considered release is given in the text of the present document that uses TS 36.133 [3].

[4] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

NOTE: The considered release is given in the text of the present document that uses TS 36.306 [4].

[5] Void

[6] 3GPP TS 36.102: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception for satellite access".

NOTE: The considered release is given in the text of the present document that uses TS 36.102 [6].

# 3 Definitions 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 36.101 [2] or TS 36.133 [3] of these frozen releases, the corresponding requirements are captured in TS 36.307 via pointers to [2] or [3] of the release in which the feature was introduced.

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

## 3.2 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].

4Rx 4 UE receiver antenna ports

CA Carrier Aggregation

CRS Cell-specific Reference Signal

CSI Channel State Indicator

FDD Frequency Division Duplex

LAA License-Assisted Access

RRC Radio Resource Control

RRM Radio Resource Management

SDR Sustained Data Rate

TDD Time Division Duplex

UE User Equipment

## 3.3 Symbols

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

N Release in which a feature is introduced into TS 36.101 [2] or TS 36.133 [3]

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

# 3A Release independent features

## 3A.0 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 36.101 [2] and TS 36.133 [3] 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 36.307 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 36.306 [4] according to the release to which the UE conforms.

## 3A.1 Additional E-UTRA operating bands

Requirements for a Rel-17 UE for additional E-UTRA operating bands compared to TS 36.101 Rel-17 [2] are introduced via this clause.

Table 3A.1-1: E-UTRA operating bands and UE power class

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Duplex-mode | Release  independent from | Requirements to be fulfilled  (see TS 36.307 of the release in which the band was introduced) |
| Operating bands, band number <= 64, Power Class 3 | FDD, TDD | Rel-8 | Table B.2.1-1, Table B.4.1-1 |
| Operating bands, band number > 64, Power Class 3 | FDD, TDD | Rel-9 | Table B.2.1-1, Table B.4.1-1 |
| Operating bands, NS-value > 32 | FDD, TDD | Rel-10 | Table B.2.1-1, Table B.4.1-1 |
| Asymmetric operating bands, Power Class 3 | FDD | Rel-10 | Table B.2.1-1, Table B.4.1-1 |
| Operating bands, band number <= 64, Power Class 1 | FDD | Rel-10 | Table B.2.1-1, Table B.4.1-1 |
| Operating bands, Power Class 2 | TDD | Rel-10 | Table B.2.1-1, Table B.4.1-1 |

For example, Band 19 was introduced in the Release 9 specifications. In order to implement a UE conforming to Release 8 but supporting Band 19, it is necessary for the UE to additionally conform to some parts of the Release 9 specifications (see corresponding Annexes of TS 36.307 Rel-9 which will point to the requirements in the Rel-9 of TS 36.101 [2] or TS 36.133 [3] to be fulfilled), such as the radio frequency and radio resource management requirements for the Band 19.

## 3A.2 Additional E-UTRA CA configurations

Requirements for a Rel-17 UE for additional E-UTRA CA configurations compared to TS 36.101 Rel-17 [2] are introduced via this clause.

Table 3A.2-1: Intra-band contiguous CA configurations and UE CA power class

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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 and the power class were introduced) |
| Intra-band contiguous CA configurations, power class 3 | DL | B | FDD | Rel-10 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| C | FDD, TDD | Rel-10 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| D | TDD | Rel-10 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| E | TDD | Rel-11 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| F | TDD | Rel-12 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| UL | B | FDD | Rel-10 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| C, D | FDD, TDD | Rel-10 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| Intra-band contiguous CA configurations, power class 2 | UL | C | TDD | Rel-10 | Table B.2.2-1, Table B.3.2-1, Table B.4.2-1 |
| NOTE: The duplex mode "FDD, TDD" refers to a CA configuration composed by only FDD bands or only TDD bands, respectively. | | | | | |

Table 3A.2-2: Inter-band CAconfigurations

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of bands | number of CCs | CA BW Classes | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 36.307 of the REL in which the CA configuration was introduced) |
| Inter-band CA configurations | DL | 2 | 2-4 | A, B, C | FDD, TDD | Rel-10 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 2-5 | D, E | FDD, TDD | Rel-11 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 2-5 | A, B, C, D, E | FDD and TDD | Rel-12 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | A, C, D, E, F | FDD, TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | FDD and TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 3 | 3 | A | FDD, TDD | Rel-10 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 3-5 | B, C, D | FDD, TDD | Rel-11 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 3 | A | FDD and TDD | Rel-12 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | A, C, D, E, F | FDD, TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | FDD and TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 4 | 4-5 | A, C | FDD, TDD | Rel-11 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 4-5 | FDD and TDD | Rel-12 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | A, C, D, E | FDD, TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | FDD and TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 5 | 5 | A | FDD, TDD | Rel-12 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 5 | FDD and TDD | Rel-12 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | A, C, D | FDD, TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 6-7 | FDD and TDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
|  | 6 | 6 | A | FDD | Rel-14 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| UL | 2 | 2-4 | A, C | FDD, TDD | Rel-11 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| 2-3 | A, C | FDD and TDD | Rel-12 | Table B.2.4-1, Table B.3.2-1, Table B.4.3-1 or Table B.4.4-1 |
| NOTE1: The duplex mode "FDD, TDD" refers to a CA configuration composed by only FDD bands or only TDD bands, respectively. The duplex mode "FDD and TDD" refers to a CA configuration including both FDD and TDD bands.  NOTE2: CA configurations involving downlink only operation in Band 46 are release independent from Rel-13 onwards (LAA was introduced in Rel-13). The 10 MHz channel bandwidth for Band 46 was introduced in TS 36.101 Rel-14 [2] and can be implemented in a release independent way from Rel-13. | | | | | | | |

For example, CA configuration CA\_1A-19A was introduced in the Release 11 specifications. In order to implement a UE conforming to Release 10 but supporting the CA configuration CA\_1A-19A, it is necessary for the UE to additionally conform to some parts of the Release 11 specifications (see corresponding Annexes of TS 36.307 Rel-11 which will point to the requirements in the Rel-11 of TS 36.101 [2] or TS 36.133 [3] to be fulfilled), such as the radio frequency and radio resource management requirements for the CA configuration CA\_1A-19A.

Table 3A.2-3: Intra-band non-contiguous CA configurations

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Feature | DL/UL | number of sub-blocks | number of CCs | CA BW Classes | Duplex-mode | Release  independent from | requirements to be fulfilled  (see 36.307 of the REL in which the CA configuration was introduced) |
| Intra-band non-contiguous CA configurations | DL | 2 | 2-5 | A, C, D | FDD, TDD | Rel-11 | Table B.2.3-1, Table B.3.2-1, Table B.4.5-1 |
| 3 | 3-5 | A, C | FDD, TDD | Rel-11 | Table B.2.3-1, Table B.3.2-1, Table B.4.5-1 |
| UL | 2 | 2 | A | FDD | Rel-11 | Table B.2.3-1, Table B.3.2-1, Table B.4.5-1 |
| NOTE1: The duplex mode "FDD, TDD" refers to a CA configuration composed by only FDD bands or only TDD bands, respectively. | | | | | | | |

## 3A.3 Additional operating bands and/or CA configurations for specific features

For a specific feature introduced in an earlier release, it may be decided in a later release to apply this specific feature in a release independent way for additional operating bands and/or CA configurations. For a Rel-17 UE corresponding requirements are then introduced via this clause.

Table 3A.3-1: Operating bands for specific features

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Release  independent from | Requirements to be fulfilled  (see 36.307 of the REL when the feature was introduced) | Further information |
| Operating bands for UE category 0 | Rel-12 | Table B.2.9-1, Table B.3.5-1, Table B.4.10-1 | Rel-14 WI LC\_MTC\_LTE\_cat0\_B25\_B26-Core introduced RF, RRM, demodulation and CSI requirements for bands 25 and 26, see Table B.2.9-1, Table B.3.5-1, Table B.4.10-1 |
| Operating bands for UE category M1 | Rel-13 | Table B.2.10-1, Table B.3.6-1, Table B.4.11-1 | Rel-14 WI LTE\_MTCe2\_L1\_cat1\_B25\_B40-Core introduced RF, RRM, demodulation and CSI requirements for bands 25 and 40, see Table B.2.10-1, Table B.3.6-1, Table B.4.11-1.  Rel-15 WI LTE\_bands\_R15\_M1\_NB1-Core introduced RF, RRM, demodulation and CSI requirements for bands 14 and 71, see Table B.2.10-1, Table B.3.6-1, Table B.4.11-1.  Rel-17 WI LTE\_bands\_R17\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 24 and band 48, see Table B.2.10-1, Table B.3.6-1, Table B.4.11-1.  Rel-18 WI LTE\_bands\_R18\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 54, see Table B.2.10-1, Table B.3.6-1, Table B.4.11-1. |
| Operating bands for HD-FDD UE category M1, Power class 2 | Rel-13 | Table B.2.10-1, Table B.3.6-1, Table B.4.11-1 | Rel-16 WI LTE\_PC2\_B31\_B72 introduced power class 2 feature for bands 31 and 72. |
| Operating bands for UE category M2 | Rel-14 | Table B.2.11-1, Table B.3.6-1, Table B.4.11-1 | Rel-15 WI LTE\_bands\_R15\_M2\_NB2-Core introduced RF and RRM requirements for bands 14 and 71, see Table B.2.11-1, Table B.4.11-1.  Rel-17 WI LTE\_bands\_R17\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 24 and band 48, see Table B.2.11-1, Table B.3.6-1, Table B.4.11-1.  Rel-18 WI LTE\_bands\_R18\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 54, see Table B.2.11-1, Table B.3.6-1, Table B.4.11-1 |
| Operating bands for HD-FDD UE category M2, Power class 2 | Rel-14 | Table B.2.11-1, Table B.4.11-1 | Rel-16 WI LTE\_PC2\_B31\_B72 introduced power class 2 feature for bands 31 and 72. |
| Operating bands for (FDD) UE category NB1 | Rel-13 | Table B.2.8-1, Table B.3.7-1, Table B.4.9-1 | Rel-14 WI NB\_IOT\_R14\_bands introduced RF, RRM and demodulation requirements for bands 11, 21, 25, 31, 70, see Table B.2.8-1, Table B.3.7-1, Table B.4.9-1.  Rel-15 WI LTE\_bands\_R15\_M1\_NB1-Core introduced RF, RRM and demodulation for bands 4, 14 and 71 see Table B.2.8-1, Table B.3.7-1, Table B.4.9-1.  Rel-16 WI LTE\_bands\_R16\_M1\_NB1 introduced RF, RRM, demodulation for band 65, see Table B.2.8-1, Table B.3.7-1, Table B.4.9-1.  Rel-17 WI LTE\_bands\_R17\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 24, see Table B.2.8-1, Table B.3.7-1, Table B.4.9-1. |
| Operating bands (FDD) for UE category NB2 | Rel-14 | Table B.2.12-1, Table 3.7-1, Table B.4.9-1 | Rel-15 WI LTE\_bands\_R15\_M2\_NB2-Core introduced RF, RRM and demodulation requirements for bands 4, 14 and 71, see Table B.2.12-1, Table 3.7-1, Table B.4.9-1.  Rel-16 WI LTE\_bands\_R16\_M2\_NB2 introduced RF, RRM, demodulation for band 65 , see Table B.2.12-1, Table B.3.7-1, Table B.4.9-1.  Rel-17 WI LTE\_bands\_R17\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 24, see Table B.2.8-1, Table B.3.7-1, Table B.4.9-1. |
| Operating bands (TDD) for UE category NB1 and NB2 | Rel-15 | Table B.2.12-1, Table 3.7-1, Table B.4.9-1 | Rel-16 WI LTE\_bands\_R16\_M1\_NB1 and Rel-16 WI LTE\_bands\_R16\_M2\_NB2 introduced RF, RRM, demodulation for band 42 and band 43, see Table B.2.12-1, Table B.3.7-1, Table B.4.9-1.  Rel-17 WI LTE\_bands\_R17\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 48, see Table B.2.12-1, Table B.3.7-1, Table B.4.9-1.  Rel-18 WI LTE\_bands\_R18\_M1\_M2\_NB1\_NB2 introduced RF, RRM, demodulation for band 54, see Table B.2.12-1, Table B.3.7-1, Table B.4.9-1. |
| Operating bands for UE category 1bis | Rel-13 | Table B.2.15-1, Table B.3.8-1, Table B.4.14-1 | Rel-16 RF, RRM, demodulation and CSI requirements for band 34 and band 40, see Table B.2.15-1, Table B.3.8-1, Table B.4.14-1. |

Table 3A.3-2: CA configurations for specific features

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Release  independent from | Requirements to be fulfilled  (see 36.307 of the REL when the feature was introduced) | Further information |
| Operating bands for V2X communication with con-current operation | Rel-14 | Table B.2.13-1, Table B.4.12-1 | Rel-15 WI V2X new band combinations (V2X\_5A-47A, V2X\_20A-47A, V2X\_34A-47A, V2X\_28A-47A, V2X\_71A-47A) introduced and should be satisfied for the RF and RRM requirements in Table B.2.13-1, Table B.4.12-1 |
| Operating band for V2X communication with multi-carrier at Band 47 | Rel-14 | Table B.2.13-1, Table B.4.12-1 | In Rel-15 WI for eV2X, introduce intra-band multi-carrier V2X\_47C and V2X\_47C1 and should be satisfied for the RF and RRM requirements in Table B.2.13-1, Table B.4.12-1 |

## 3A.4 Other release independent features

This clause covers requirements for a Rel-17 UE coming from all other release independent features that are not covered under clause 3A.1, 3A.2 and 3A.3, e.g. generic baseband requirements or requirements that are not band/CA configuration specific.

Table 3A.4-1: Additional requirements of other release independent features

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Release  independent from | Requirements to be fulfilled  (see 36.307 of the REL when the feature was introduced) | Further information |
| RF and performance requirements for 4Rx UEs | Rel-10 | Table C.1-1, Table C.2-1 for single carrier and Table C.1-2, Table C.2-2 for CA | Rel-13 WI LTE\_4Rx\_AP\_DL introduced:  - single carrier RF requirements for bands 1, 2, 3, 7, 20, 39, 41, 42: see Table C.1-1  - CA RF requirements for CA\_3A-42A and other 1UL CA configurations (see TS 36.101 REL-13 [2] Table 7.3.1A-0a NOTE 20): see Table C.1-2  - single carrier performance requirements for demodulation and CSI: see Table C.2-1  REL-14 WI LTE\_4Rx\_AP\_DL\_bands introduced:  - single carrier RF requirements for band 35, 40: see Table C.1-1  - CA RF requirements for some further 1UL CA configurations (see TS 36.101 REL-14 [2]): see Table C.1-2  REL-14 WI LTE\_4Rx\_AP\_DL\_CA introduced:  - CA RF requirements for some 2DL/2UL CA configurations (see TS 36.101 REL-14 [2]): see Table C.1-2  - CA performance requirements for demodulation/SDR and CSI: see Table C2-2  REL-15 WI LTE\_4Rx\_AP\_DL\_bands\_R15 introduced:  - single carrier RF requirements for band 4, 34, 43, 66: see Table C.1-1  - CA RF requirements for some further 1UL CA configurations (see TS 36.101 REL-15 [2]): see Table C.1-2 |
| RF and performance requirements for 8Rx UEs | Rel-13 | Table E.1-1, Table E.2-1 for single carrier and Table E.1-2, Table E.2-2 for CA | Rel-15 WI LTE\_8Rx\_AP\_DL introduced:  - single carrier RF requirements for band 41, 42,43: see Table E.1-1  - CA RF requirements for CA\_41C, CA\_42C and CA\_41A-42A CA configurations (see TS 36.101 Rel-15 [2]): see Table E.1-2  - single carrier performance requirements for demodulation and CSI: see Table E.2-1  - CA performance requirements for demodulation/SDR: see Table E.2-2 |
| RRM and demodulation requirements for high speed scenario | Rel-13 (NOTE 1) | Table D.1-1, Table D.2-1 | Rel-14 WI LTE\_high\_speed introduced band independent RRM and demodulation requirements. see Table D.1-1, Table D.2-1 |
| RF, RRM and demodulation requirements for NB-IoT standalone operation over NTN | Rel-17 | Table F.1-1 for UE RF requirements,  Table F.2-1 for RRM requirements  Table F.3-1 for UE demodulation requirements | Rel-18 WI LTE\_NBIoT\_eMTC\_NTN\_req introduced RF, RRM and demodulation requirements for NB-IoT standalone operation over NTN.  See tables F.1-1, F.2-1, F.3-1. |
| RF, RRM and demodulation requirements for eMTC operation over NTN | Rel-17 | Table F.1-2 for UE RF requirements,  Table F.2-2 for RRM requirements  Table F.3-2 for UE demodulation requirements | Rel-18 WI LTE\_NBIoT\_eMTC\_NTN\_req introduced RF, RRM and demodulation requirements for eMTC operation over NTN.  See tables F.1-2, F.2-2, F.3-2. |
| NOTE: Rel-13 UEs supporting the high speed scenario requirements are assumed to read the Rel-14 high speed scenario information, which is broadcast to all UEs. | | | |

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Annex A (informative) :  
Frequency arrangement for overlapping operating bands

The following information is provided in order to assist a UE derive the DL EARFCN and UL EARFCN in a multi-band environment, in which multiple overlapping operating bands may be indicated in the fields *freqBandIndicator* and *multiBandInfoList* of SIB1.

The overlapping bands, independent of release, which may be indicated in a cell are shown in Table A-1 for applicable E-UTRA bands. The DL EARFCN and UL EARFCN are derived according to TS 36.101 Rel-17 [2].

Table A-1: Overlapping bands (multi-band environments) for each E-UTRA band

|  |  |  |
| --- | --- | --- |
| E-UTRA Operating Band | Overlapping E-UTRA operating bands | Duplex Mode |
| 2 | 25 | FDD |
| 3 | 9 | FDD |
| 4 | 10, 66 | FDD |
| 5 | 18, 19, 26 | FDD |
| 8 | 106 | FDD |
| 9 | 3 | FDD |
| 10 | 4, 66 | FDD |
| 12 | 17 | FDD |
| 17 | 12 | FDD |
| 18 | 5, 26, 27 | FDD |
| 19 | 5, 26 | FDD |
| 25 | 2 | FDD |
| 26 | 5, 18, 19, 27 | FDD |
| 27 | 18, 26 | FDD |
| 33 | 39 | TDD |
| 38 | 41 | TDD |
| 39 | 33 | TDD |
| 41 | 38 | TDD |
| 66 | 4, 10 | FDD |
| 106 | 8 | FDD |

Annex B (normative):  
Common Requirements for bands or CA

# B.1 Purpose of annex

The purpose of Annex B is to group the requirements that are common for several bands or CA configurations in this specification and use the common tables as references.

# B.2 Common RRM requirements

## B.2.1 Common RRM requirements for a release independent band

The requirements and test cases listed in Table B.2.1-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.1-1: Common RRM requirements for a release independent band

|  |  |
| --- | --- |
| Clause | Description |
| 4 Note 1 | E-UTRAN RRC\_IDLE state mobility |
| 5 | E-UTRAN RRC\_CONNECTED state mobility |
| 6 Note 2 | RRC Connection Mobility Control |
| 7 Note 3 | Timing and signalling characteristics |
| 8 Note 4 | UE Measurements Procedures in RRC\_CONNECTED State |
| 9 Note 5 | Measurements performance requirements for UE |
| A.4 Note 1 | E-UTRAN RRC\_IDLE state |
| A.5 | E-UTRAN RRC CONNECTED Mode Mobility |
| A.6 Note 2 | RRC Connection Control |
| A.7 Note 3 | Timing and Signalling Characteristics |
| A.8 Note 4 | UE Measurements Procedures |
| A.9 Note 5 | Measurement Performance Requirements |
| NOTE 1: All requirements and the corresponding test cases shall apply, except:  - for supporting the corresponding band in Rel-9 and below: clause 4.3 (Minimization of Drive Tests).  NOTE 2: All requirements and the corresponding test cases shall apply, except:  - for supporting the corresponding band in Rel-8: clauses 6.3 (RRC Connection Release with Redirection), 6.4 (CSG Proximity Indication for E-UTRAN and UTRAN).  NOTE 3: All requirements and corresponding test cases shall apply, except those defined in clauses 7.4 and 7.5.  NOTE 4: All requirements and corresponding test cases shall apply, except:  - for supporting the corresponding band in Rel-8: clauses 8.1.2.5 (E-UTRAN OTDOA Intra-Frequency RSTD Measurements), 8.1.2.6 (E-UTRAN Inter-Frequency OTDOA Measurements), 8.1.2.7 (E-UTRAN E-CID Measurements).  NOTE 5: All requirements and corresponding test cases shall apply, except:  - for supporting the corresponding band in Rel-8: clauses 9.1.9 (UE Rx–Tx time difference), 9.1.10 (Reference Signal Time Difference).  - for supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  - for supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB.  NOTE 6: In addition to the exceptions above, all requirements and test cases in this table shall apply, except those defined for:  - carrier aggregation;  - for supporting the corresponding band in Rel-9 or below: measurements under time-domain measurement resource restriction without CRS assistance information;  - for supporting the corresponding band in Rel-10 or below: measurements under time-domain measurement resource restriction with CRS assistance information;  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12. | |

## B.2.2 Common RRM requirements for an intra-band contiguous CA configuration

The requirements and test cases listed in Table B.2.2-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.2-1: Common RRM requirements for a release independent single-band CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| A.7 | Timing and Signalling Characteristics |
| A.8 | UE Measurements Procedures |
| A.9 Note 3 | Measurement Performance Requirements |
| NOTE 1: Only requirements and test cases defined for intra-band contiguous carrier aggregation shall apply.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: - For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  - For supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.3 Common RRM requirements for an intra-band non-contiguous CA with single uplink configuration

The requirements and test cases listed in Table B.2.3-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.3-1: Common RRM requirements for a release independent single-band CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| A.7 | Timing and Signalling Characteristics |
| A.8 | UE Measurements Procedures |
| A.9 Note 3 | Measurement Performance Requirements |
| NOTE 1: Only requirements and test cases defined for intra-band non-contiguous carrier aggregation with single uplink shall apply.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: - For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB  - for supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.4 Common RRM requirements for an inter-band CA with single uplink configuration

The requirements and test cases listed in Table B.2.4-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.4-1: Common RRM requirements for a release independent band-combination CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| A.7 | Timing and Signalling Characteristics |
| A.8 | UE Measurements Procedures |
| A.9 Note 3 | Measurement Performance Requirements |
| NOTE 1: Only requirements and test cases defined for inter-band with single uplink carrier aggregation shall apply.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: - For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  - for supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.5 Common RRM requirements for an inter-band CA with dual uplink configuration

The requirements and test cases listed in Table B.2.5-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.5-1: Common RRM requirements for a release independent band-combination CA configuration with dual uplink

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 7.17 | Maximum Transmission Timing Difference in Dual Connectivity |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| A.7 | Timing and Signalling Characteristics |
| A.8 | UE Measurements Procedures |
| A.9 Note 3 | Measurement Performance Requirements |
| NOTE 1: Only requirements and test cases defined for inter-band with dual uplink carrier aggregation shall apply.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: - For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  - for supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.6 Common RRM requirements for an intra-band non-contiguous CA with dual uplink configuration

The requirements and test cases listed in Table B.2.6-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.6-1: Common RRM requirements for a release independent single-band CA configuration with dual uplink

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 7.17 | Maximum Transmission Timing Difference in Dual Connectivity |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| A.7 | Timing and Signalling Characteristics |
| A.8 | UE Measurements Procedures |
| A.9 Note 3 | Measurement Performance Requirements |
| NOTE 1: Only requirements and test cases defined for intra-band non-contiguous carrier aggregation with dual uplinks shall apply.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: - For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  - for supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.7 Common RRM requirements for an inter-band CA with three uplink configuration

The requirements and test cases listed in Table B.2.7-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.7-1: Common RRM requirements for a release independent band-combination CA configuration with three uplink

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 7.17 | Maximum Transmission Timing Difference in Dual Connectivity |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| NOTE 1: Only requirements defined for three uplink carrier aggregation shall apply. There are no test cases defined with a three uplink carrier aggregation configuration.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: - For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  - for supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.8 Common RRM requirements for operating bands for UE category NB1

The requirements and test cases listed in Table B.2.8-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.8-1: Common RRM requirements for release independent  
operating bands for UE category NB1

|  |  |
| --- | --- |
| Clause | Description |
| 4.6 | Cell Selection and Reselection Requirements for UE category NB1 |
| 6.6 | Random Access for UE category NB1 |
| 7.23 | Radio Link Monitoring for category NB1 UE |
| 8.14 | Measurements for UE category NB1 |
| 9.1.22 | Measurement accuracy for UE Category NB1 |
| 9.1.23 | Power Headroom for UE category NB1 |
| NOTE 1: Only requirements and test cases defined for UE category NB1 shall apply. | |

## B.2.9 Common RRM requirements for operating bands for UE category 0

The requirements and test cases listed in Table B.2.9-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.9-1: Common RRM requirements for release independent  
operating bands for a UE category 0

|  |  |
| --- | --- |
| Clause | Description |
| 7.11 | Radio Link Monitoring for UE category 0 |
| 8.5 | Measurements for UE category 0 |
| 9.1.13 | Measurement accuracy for UE category 0 |

## B.2.10 Common RRM requirements for operating bands for UE category M1

The requirements and test cases listed in Table B.2.10-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.10-1: Common RRM requirements for release independent  
operating bands for a UE category M1

|  |  |
| --- | --- |
| Clause | Description |
| 4.7 | Cell Selection and Re-selection Requirements for UE category M1 |
| 5.5 | E-UTRAN Handover for cat.M1 UEs in CEModeA |
| 5.6 | E-UTRAN Handover for cat.M1 UEs in CEModeB |
| 6.2.3 | Random Access Requirements for cat.M1 UEs |
| 6.7 | RRC Re-establishment for cat.M1 UEs |
| 6.8 | RRC Connection Release with Redirection for Cat-M1 UEs |
| 7.19 | Radio Link Monitoring for UE Category M1 |
| 7.24 | UE transmit timing for category M1 |
| 7.27 | UE timer accuracy for category M1 |
| 7.28 | Timing Advance for Category M1 |
| 8.13 | Measurements for UE category M1 |
| 9.1.21 | Measurement accuracy for UE category M1 |

## B.2.11 Common RRM requirements for operating bands for UE category M2

The requirements and test cases listed in Table B.2.11-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.11-1: Common RRM requirements for release independent  
operating bands for a UE category M2

|  |  |
| --- | --- |
| Clause | Description |
| 4.7 | Cell Selection and Re-selection Requirements |
| 5.5 | E-UTRAN Handover in CEModeA |
| 5.6 | E-UTRAN Handover in CEModeB |
| 6.2.3 | Random Access Requirements |
| 6.7 | RRC Re-establishment |
| 6.8 | RRC Connection Release with Redirection |
| 7.19 | Radio Link Monitoring |
| 7.26 | UE transmit timing for category M2 |
| 7.27 | UE timer accuracy |
| 7.28 | Timing Advance |
| 8.13.2.1 and 8.13.3.1 | E-UTRAN intra frequency measurement requirements |
| 8.13.2.6 and 8.13.3.5 | E-UTRAN inter frequency measurement requirements |
| 8.13.2.7 and 8.13.3.6 | UE measurement capability |
| 8.13.2.5.1, 8.13.2.5.2, 8.13.2.5.3, 8.13.2.5.4, 8.13.2.5.5, 8.13.2.5.6 and 8.13.3.4 | E-UTRAN E-CID measurements requirements |
| 8.16 | Measurements for UE Category M2 |
| 9.1.21 | Measurement accuracy |
| 9.1.25 | Measurement accuracy for UE category M2 |

## B.2.12 Common RRM requirements for operating bands for UE category NB2

The requirements and test cases listed in Table B.2.12-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.12-1: Common RRM requirements for release independent  
operating bands for UE category NB2

|  |  |
| --- | --- |
| Clause | Description |
| 4.6.1 and 4.6.2 | Cell selection and re-selection requirements |
| 4.8 | UE Positioning measurement in idle state |
| 6.5 | RRC Re-establishment requirements |
| 6.6 | Random access requirements |
| 6.9 | RRC connection redirection to non-anchor carrier requirements |
| 7.20 | UE transmit timing requirements |
| 7.21 | UE timer accuracy requirements |
| 7.22 | Timing advance requirements |
| 7.23 | Radio link monitoring requirements |
| 8.14 | UE RRC\_CONNECTED state measurement requirement |
| 9.1.22 | UE measurement accuracy requirements |
| 9.1.23 | Power headroom requirements |
| NOTE 1: Only requirements and test cases defined for UE category NB2 shall apply. | |

## B.2.13 Common RRM requirements for operating bands for LTE-based V2X Communication

The requirements and test cases listed in Table B.2.13-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.13-1: Common RRM requirements for release independent operating bands for LTE-based V2X communication

|  |  |
| --- | --- |
| Clause | Description |
| 13.2 | UE Transmit Timing |
| 13.3 | Initiation/Cease of SLSS Transmissions |
| 13.4 | Selection / Reselection of V2X Synchronization Reference Source |
| 13.5 | Autonomous Resource Selection/Reselection measurements |
| 13.6 | Congestion Control measurements |
| 13.7 | Interruption |
| 13.8 | Reliability of GNSS signal |

## B.2.14 Common RRM requirements for an inter-band CA with four uplink configuration

The requirements and test cases listed in Table B.2.14-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.14-1: Common RRM requirements for a release independent band-combination CA configuration with four uplink

|  |  |
| --- | --- |
| Clause | Description |
| 7.1 | UE transmit timing |
| 7.7 | SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation |
| 7.8 | Interruptions with Carrier Aggregation |
| 7.17 | Maximum Transmission Timing Difference in Dual Connectivity |
| 8.2 | Capabilities for Support of Event Triggering and Reporting Criteria |
| 8.3 | Measurements for E-UTRA carrier aggregation |
| 8.4 | OTDOA RSTD Measurements for E-UTRAN carrier aggregation |
| 9.1.11 Note 3 | Carrier aggregation measurement accuracy |
| 9.1.12 | Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation |
| NOTE 1: Only requirements defined for four uplink carrier aggregation shall apply. There are no test cases defined with a four uplink carrier aggregation configuration.  NOTE 2: In addition to the exceptions above, all requirements and test cases in this table shall apply, except:  - for supporting the corresponding band in Rel-11 or below: requirements introduced in Rel-12.  NOTE 3: For supporting the corresponding band in Rel-11 or below: the RSRP absolute accuracy requirement under normal conditions in table 9.1.2.1-1, 9.1.2.3-1, 9.1.2.5-1 and 9.1.3.1-1 when Io≤-70dBm is ±6dB.  For supporting the corresponding band in Rel-11 or below: the interfrequency RSRP relative accuracy requirement under normal conditions in table 9.1.3.2-1 is ±6dB. | |

## B.2.15 Common RRM requirements for operating bands for UE category 1bis

The requirements and test cases listed in Table B.2.15-1 are specified in TS 36.133 Rel-17 [3].

Table B.2.15-1: Common RRM requirements for release independent  
operating bands for a UE category 1bis

|  |  |
| --- | --- |
| Clause | Description |
| 8.1.2.5.3, 8.1.2.5.4 | Intra-Frequency OTDOA Measurements for UE Category 1bis |
| 8.1.2.6.5, 8.1.2.6.6, 8.1.2.6.7, 8.1.2.6.8 | Inter-Frequency OTDOA Measurements for UE Category 1bis |
| 9.1.2.7, 9.1.2.8 | Intra-frequency RSRP Accuracy Requirements for UE Category 1bis |
| 9.1.3.1, 9.1.3.4 | Intra-frequency RSRP Accuracy Requirements for UE Category 1bis |
| 9.1.5.5 | Intra-frequency RSRQ Accuracy Requirements for UE Category 1bis |
| 9.1.6.5, 9.1.6.6 | Inter-frequency RSRQ Accuracy Requirements for UE Category 1bis |
| 9.1.10.5, 9.1.10.6 | Reference Signal Time Difference (RSTD) for UE Category 1bis |

# B.3 Common UE performance requirements

## B.3.1 Void

## B.3.2 Common UE performance requirements and tests for different CA configurations and combination sets

The requirements and test cases listed in Table B.3.2-1 are specified in TS 36.101 Rel-17 [2].

Table B.3.2-1: Common UE performance requirements and tests for different CA configurations and combination sets

|  |  |
| --- | --- |
| Clause | Description |
| 8.2.1.1.1 | Single-antenna port performance (FDD) |
| 8.2.2.1.1 | Single-antenna port performance (TDD) |
| 8.2.3.1.1 | Single-antenna port performance (TDD-FDD CA) |
| 8.2.1.3.1 | Open-loop spatial multiplexing performance - Minimum Requirement 2 Tx Antenna Port (FDD) |
| 8.2.2.3.1 | Open-loop spatial multiplexing performance - Minimum Requirement 2 Tx Antenna Port (TDD) |
| 8.2.3.3.1 | Open-loop spatial multiplexing performance - Minimum Requirement 2 Tx Antenna Port (TDD-FDD CA) |
| 8.2.1.3.1A | Open-loop spatial multiplexing performance - Soft buffer management test (FDD) |
| 8.2.2.3.1A | Open-loop spatial multiplexing performance - Soft buffer management test (TDD) |
| 8.2.3.3.1A | Open-loop spatial multiplexing performance - Soft buffer management test (TDD-FDD CA) |
| 8.2.1.4.3 | Closed-loop spatial multiplexing performance - Minimum Requirement Multi-Layer Spatial Multiplexing 4 Tx Antenna Port (FDD) |
| 8.2.2.4.3 | Closed-loop spatial multiplexing performance - Minimum Requirement Multi-Layer Spatial Multiplexing 4 Tx Antenna Port (TDD) |
| 8.2.3.4.3 | Closed-loop spatial multiplexing performance - Minimum Requirement Multi-Layer Spatial Multiplexing 4 Tx Antenna Port (TDD-FDD CA) |
| 8.2.1.7 | Carrier aggregation with power imbalance (FDD) |
| 8.2.1.8 | Intra-band non-contiguous carrier aggregation with timing offset (FDD) |
| 8.2.2.7 | Carrier aggregation with power imbalance (TDD) |
| 8.7.1 | Sustained downlink data rate provided by lower layers (FDD) |
| 8.7.2 | Sustained downlink data rate provided by lower layers (TDD) |
| 8.7.5 | Sustained downlink data rate provided by lower layers (TDD-FDD CA) |
| 8.7.12.1 | Sustained downlink data rate provided by lower layers (FDD CA in licensed bands) |
| 8.7.12.2 | Sustained downlink data rate provided by lower layers (TDD CA in licensed bands) |
| 8.7.12.3 | Sustained downlink data rate provided by lower layers (TDD-FDD CA in licensed bands) |
| 9.6.1.1 | Additional requirements for carrier aggregation - Periodic reporting on multiple cells (Cell Specific Reference symbols) (FDD) |
| 9.6.1.2 | Additional requirements for carrier aggregation - Periodic reporting on multiple cells (Cell Specific Reference symbols) (TDD) |
| 9.6.1.3 | Additional requirements for carrier aggregation - Periodic reporting on multiple cells (Cell Specific Reference symbols) (TDD-FDD CA) |
| NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is specified in Clause 8.1.2.3 and 9.1.1.2.  NOTE 2: The test coverage for different number of component carriers is defined in 8.1.2.4. | |

## B.3.3 Void

## B.3.4 Void

## B.3.5 Common UE performance requirements and tests for operating bands for UE category 0

The requirements and test cases listed in Table B.3.5-1 are specified in TS 36.101 Rel-17 [2].

Table B.3.5-1: Common UE performance requirements and tests for release independent operating bands for UE category 0

|  |  |
| --- | --- |
| Clause | Description |
| 8.9 | Demodulation (single receiver antenna) |
| 9.7 | CSI reporting (Single receiver antenna) |

## B.3.6 Common UE performance requirements and tests for operating bands for UE category M1 and M2

The requirements and test cases listed in Table B.3.6-1 are specified in TS 36.101 Rel-17 [2].

Table B.3.6-1: Common UE performance requirements and tests for release independent operating bands for UE category M1 and M2

|  |  |
| --- | --- |
| Clause | Description |
| 8.11 | Demodulation (UE supporting coverage enhancement) |
| 9.8 | CSI reporting (UE supporting coverage enhancement) |

## B.3.7 Common UE performance requirements and tests for operating bands for UE category NB1 and NB2

The requirements and test cases listed in Table B.3.7-1 are specified in TS 36.101 Rel-17 [2].

Table B.3.7-1: Common UE performance requirements and tests for release independent operating bands for UE category NB1 and NB2

|  |  |
| --- | --- |
| Clause | Description |
| 8.12 | Demodulation of Narrowband IoT |

## B.3.8 Common UE performance requirements and tests for operating bands for UE category 1bis

The requirements and test cases listed in Table B.3.8-1 are specified in TS 36.101 Rel-17 [2].

Table B.3.8-1: Common UE performance requirements and tests for release independent operating bands for UE category 1bis

|  |  |
| --- | --- |
| Clause | Description |
| 9.7.1.3, 9.7.1.4, 9.7.2.3, 9.7.2.4 | CSI reporting (Single receiver antenna) |

# B.4 Common UE RF requirements

## B.4.1 Common UE RF requirements for a release independent band

The requirements and test cases listed in Table B.4.1-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.1-1: Common UE RF requirements for a release independent band

|  |  |
| --- | --- |
| Clause | Description |
| 5.5 | Operating bands |
| 5.6 | Channel bandwidth |
| 5.7 | Channel arrangement |
| 6.2 | Transmit power |
| 6.3 | Output power dynamics |
| 6.5 | Transmit signal quality |
| 6.6 | Output RF spectrum emissions |
| 6.7 | Transmit intermodulation |
| 7.3 | Reference sensitivity power level |
| 7.4 | Maximum input level |
| 7.5 | Adjacent Channel Selectivity (ACS) |
| 7.6 | Blocking characteristics |
| 7.7 | Spurious response |
| 7.8 | Intermodulation characteristics |
| 7.9 | RX spurious emissions |

## B.4.2 Common UE RF requirements for an intra-band contiguous CA configuration

The requirements and test cases listed in Table B.4.2-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.2-1: Common UE RF requirements for a release independent intra-band contiguous CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.5A | Operating bands for CA |
| 5.6A | Channel bandwidths per operating band for CA |
| 5.7.1A | Channel spacing for CA |
| 5.7.2A | Channel raster for CA |
| 5.7.4A | TX–RX frequency separation for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.3A | UE maximum output power for modulation/channel bandwidth for CA |
| 6.2.4A | UE maximum output power with additional requirements for CA |
| 6.2.5A | Configured transmitted power for CA |
| 6.3.2A | UE Minimum output power for CA |
| 6.3.3A | UE Transmit OFF power for CA |
| 6.3.4A | ON/OFF time mask for CA |
| 6.3.5A | Power control for CA |
| 6.5.1A | Frequency error for CA |
| 6.5.2A | Transmit modulation quality for CA |
| 6.6.1A | Occupied bandwidth for CA |
| 6.6.2.1A | Spectrum emission mask for CA |
| 6.6.2.2A | Additional Spectrum Emission mask for CA |
| 6.6.2.3.2A | UTRA ACLR for CA |
| 6.6.2.3.3A | E-UTRA ACLR for CA |
| 6.6.3.1A | Minimum requirements for CA |
| 6.6.3.2A | Spurious emission band UE co-existence for CA |
| 6.6.3.3A | Additional spurious emissions for CA |
| 6.7.1A | Minimum requirement for CA |
| 7.3.1A | Reference sensitivity for CA |
| 7.4.1A | Maximum input level for CA |
| 7.5.1A | Adjacent Channel Selectivity (ACS) for CA |
| 7.6.1.1A | In-band blocking for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.6.3.1A | Narrow band blocking for CA |
| 7.7.1A | Spurious response for CA |
| 7.8.1A | Wideband intermodulation for CA |
| 7.10.1A | Receiver response for CA |

## B.4.3 Common UE RF requirements for an single uplink inter-band CA configuration

The requirements and test cases listed in Table B.4.3-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.3-1: Common UE RF requirements for a release independent inter-band CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.5A | Operating bands for CA |
| 5.6A.1 | Channel bandwidths per operating band for CA |
| 5.7.2A | Channel raster for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.3A | UE maximum output power for modulation/channel bandwidth for CA |
| 6.2.5 | Configured transmitted power |
| 7.3.1A | Reference sensitivity for CA |
| 7.4.1A | Maximum input level for CA |
| 7.5.1A | Adjacent Channel Selectivity (ACS) for CA |
| 7.6.1.1A | In-band blocking for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.6.3.1A | Narrow band blocking for CA |
| 7.7.1A | Spurious response for CA |
| 7.8.1A | Wideband intermodulation for CA |

## B.4.4 Common UE RF requirements for an inter-band CA configuration including an operating band without uplink band

The requirements and test cases listed in Table B.4.4-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.4-1: Common UE RF requirements for a release independent inter-band CA configuration including an operating band without uplink band

|  |  |
| --- | --- |
| Clause | Description |
| 5.5 | Operating bands |
| 5.5A | Operating bands for CA |
| 5.6A.1 | Channel bandwidths per operating band for CA |
| 5.7 | Channel arrangement |
| 6.2.2A | UE maximum output power for CA |
| 6.2.3A | UE maximum output power for modulation/channel bandwidth for CA |
| 6.2.5 | Configured transmitted power |
| 7.3.1A | Reference sensitivity for CA |
| 7.4.1A | Maximum input level for CA |
| 7.5.1A | Adjacent Channel Selectivity (ACS) for CA |
| 7.6.1.1A | In-band blocking for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.6.3.1A | Narrow band blocking for CA |
| 7.7.1A | Spurious response for CA |
| 7.8.1A | Wideband intermodulation for CA |

## B.4.5 Common UE RF requirements for a single uplink intra-band non-contiguous CA configuration

The requirements and test cases listed in Table B.4.5-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.5-1: Common UE RF requirements for a release independent single uplink intra-band non-contiguous CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.5A | Operating bands for CA |
| 5.6A1 | Channel bandwidths per operating band for CA |
| 5.7.2A | Channel raster for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.3A | UE maximum output power for modulation/channel bandwidth for CA |
| 7.3.1A | Reference sensitivity for CA |
| 7.4.1A | Maximum input level for CA |
| 7.5.1A | Adjacent Channel Selectivity (ACS) for CA |
| 7.6.1.1A | In-band blocking for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.6.3.1A | Narrow band blocking for CA |
| 7.7.1A | Spurious response for CA |
| 7.8.1A | Wideband intermodulation for CA |

## B.4.6 Common UE RF requirements for dual uplink inter-band CA configuration

The requirements and test cases listed in Table B.4.6-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.6-1: Common UE RF requirements for a release independent dual uplink inter-band CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.6A.1 | Channel bandwidths per operating band for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.5A | Configured transmitted Power for CA |
| 6.3.2A | UE Minimum output power for CA |
| 6.3.3A | UE Transmit OFF power for CA |
| 6.3.4A | ON/OFF time mask for CA |
| 6.3.5A | Power control for CA |
| 6.5.1A | Frequency error for CA |
| 6.5.2A | Transmit modulation quality for CA |
| 6.6.1A | Occupied bandwidth for CA |
| 6.6.2.1A | Spectrum emission mask for CA |
| 6.6.2.3 | Adjacent Channel Leakage Ratio |
| 6.6.3.1A | Spurious Emission for CA |
| 6.6.3.2A | Spurious emission band UE co-existence for CA |
| 6.7.1A | Transmit intermodulation for CA |
| 7.3.1A | Reference sensitivity for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.7.1A | Spurious response for CA |

## B.4.7 Common UE RF requirements for dual uplink intra-band non-contiguous CA configuration

The requirements and test cases listed in Table B.4.7-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.7-1: Common UE RF requirements for a release independent dual uplink intra-band non-contiguous CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.6A.1 | Channel bandwidths per operating band for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.3A | UE Maximum Output power for modulation / channel bandwidth for CA |
| 6.2.5A | Configured transmitted Power for CA |
| 6.3.2A | UE Minimum output power for CA |
| 6.3.3A | UE Transmit OFF power for CA |
| 6.3.4A | ON/OFF time mask for CA |
| 6.3.5A | Power control for CA |
| 6.5.1A | Frequency error for CA |
| 6.5.2A | Transmit modulation quality for CA |
| 6.6.1A | Occupied bandwidth for CA |
| 6.6.2.1A | Spectrum emission mask for CA |
| 6.6.2.3 | Adjacent Channel Leakage Ratio |
| 6.6.3.1A | Spurious Emission for CA |
| 6.6.3.2A | Spurious emission band UE co-existence for CA |
| 7.3.1A | Reference sensitivity for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.7.1A | Spurious response for CA |

## B.4.8 Common UE RF requirements for three uplink inter-band CA configuration

The requirements and test cases listed in Table B.4.8-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.8-1: Common UE RF requirements for a release independent three uplink inter-band CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.6A.1 | Channel bandwidths per operating band for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.5A | Configured transmitted Power for CA |
| 6.3.2A | UE Minimum output power for CA |
| 6.3.3A | UE Transmit OFF power for CA |
| 6.3.4A | ON/OFF time mask for CA |
| 6.3.5A | Power control for CA |
| 6.5.1A | Frequency error for CA |
| 6.5.2A | Transmit modulation quality for CA |
| 6.6.1A | Occupied bandwidth for CA |
| 6.6.2.1A | Spectrum emission mask for CA |
| 6.6.2.3 | Adjacent Channel Leakage Ratio |
| 6.6.3.1A | Spurious Emission for CA |
| 6.6.3.2A | Spurious emission band UE co-existence for CA |
| 6.7.1A | Transmit intermodulation for CA |
| 7.3.1A | Reference sensitivity for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.7.1A | Spurious response for CA |

## B.4.9 Common UE RF requirements for operating bands for UE category NB1 and NB2

The requirements and test cases listed in Table B.4.9-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.9-1: Common UE RF requirements for release independent operating bands for UE category NB1

|  |  |
| --- | --- |
| Clause | Description |
| 5.5F | Operating bands for category NB1 and NB2 |
| 5.6F | Channel bandwidth for category NB1 and NB2 |
| 5.7.1F | Channel spacing for category NB1 and NB2 |
| 5.7.2F | Channel raster for category NB1 and NB2 |
| 5.7.3F | Carrier frequency and EARFCN for category NB1 and NB2 |
| 5.7.4F | TX–RX frequency separation for category NB1 and NB2 |
| 6.2.2F | UE maximum output power for category NB1 and NB2 |
| 6.2.3F | UE maximum output power for category NB1 and NB2 |
| 6.2.5F | Configured transmitted Power for category NB1 and NB2 |
| 6.3.2F | UE Minimum output power for category NB1 and NB2 |
| 6.3.3F | Transmit OFF power for category NB1 and NB2 |
| 6.3.4F | ON/OFF time mask for category NB1 and NB2 |
| 6.3.5F | Power Control for category NB1 and NB2 |
| 6.5.1F | Frequency error for UE category NB1 and NB2 |
| 6.5.2F | Transmit modulation quality for Category NB1 and NB2 |
| 6.6.1F | Occupied bandwidth for category NB1 and NB2 |
| 6.6.2F | Out of band emission for category NB1 and NB2 |
| 6.6.3F | Spurious emission for category NB1 and NB2 |
| 6.7.1F | Transmission intermodulation for category NB1 and NB2 |
| 7.3.1F | Reference sensitivity for UE category NB1 and NB2 |
| 7.4.1F | Maximum input level for category NB1 and NB2 |
| 7.5.1F | Adjacent channel selectivity for category NB1 and NB2 |
| 7.6.1.1F | In-band blocking for category NB1 and NB2 |
| 7.6.2.1F | Out-of-band blocking for category NB1 and NB2 |
| 7.7.1F | Spurious response for category NB1 and NB2 |
| 7.8.1F | Intermodulation characteristics for category NB1 and NB2 |

## B.4.10 Common UE RF requirements for operating bands for UE category 0

The requirements and test cases listed in Table B.4.10-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.10-1: Common UE RF requirements for release independent operating bands for UE category 0

|  |  |
| --- | --- |
| Clause | Description |
| 5.5E | Operating bands for UE category 0 |
| 7.3.1E | Minimum requirements (QPSK) for UE category 0 |

## B.4.11 Common UE RF requirements for operating bands for UE category M1 and M2

The requirements and test cases listed in Table B.4.11-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.11-1: Common UE RF requirements for release independent operating bands for UE category M1 and M2

|  |  |
| --- | --- |
| Clause | Description |
| 5.5E | Operating bands for UE category 0, UE category M1 and M2 and UE category 1bis |
| 5.7.4E | TX–RX frequency separation for category M1 and M2 |
| 6.2.2E | UE maximum output power for Category M1 and M2 UE |
| 6.2.3E | UE maximum output power for modulation / channel bandwidth for category M1 and M2 |
| 6.2.4E | UE maximum output power with additional requirements for category M1 and M2 UE |
| 6.3.5E | Power control for category M1 and M2 |
| 6.5.1E | Frequency error for UE category M1 and M2 |
| 6.5.2E | Transmit modulation quality for category M1 and M2 |
| 6.6.3.2 | Spurious emission band UE co-existence |
| 7.3.1E | Minimum requirements (QPSK) for UE category 0, M1, M2 and 1bis |
| 7.5 | Adjacent Channel Selectivity (ACS) |
| 7.6.1 | In-band blocking |
| 7.6.2 | Out-of-band blocking |
| 7.6.3 | Narrow band blocking |
| 7.8.1 | Wide band intermodulation |

## B.4.12 Common UE RF requirements for operating bands for LTE-based V2X operation

The requirements and test cases listed in Table B.4.12-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.12-1: Common UE RF requirements for release independent operating bands for V2X operation

|  |  |
| --- | --- |
| Clause | Description |
| 5.5G | Operating bands for V2X Communication |
| 5.6G | Channel bandwidth for V2X Communication |
| 6.2.2G | UE maximum output power for V2X Communication |
| 6.2.3G | UE maximum output power for modulation / channel bandwidth for V2X Communication |
| 6.2.4G | UE maximum output power with additional requirements for V2X Communication |
| 6.2.5G | Configured transmitted power for V2X Communication |
| 6.3.2G | UE Minimum output power for V2X Communication |
| 6.3.3G | Transmit OFF power for V2X Communication |
| 6.3.4G | ON/OFF time mask for V2X Communication |
| 6.3.5G | Power Control for V2X Communication |
| 6.5.1G | Frequency error for V2X Communication |
| 6.5.2G | Transmit modulation quality for V2X Communication |
| 6.6.3G | Spurious emission for V2X Communication |
| 7.3.1G | REFSENS requirements (QPSK) for V2X communication |
| 7.4.1G | Maximum input level for V2X communication |
| 7.5.1G | Adjacent Channel Selectivity (ACS) for V2X communication |
| 7.6.1.1G | In-band blocking for V2X communication |
| 7.6.2.1G | Out-of-band blocking for V2X communication |
| 7.7.1G | Spurious response for V2X communication |
| 7.8.1G | Intermodulation characteristics for V2X communication |
| 7.10.1G | Receiver image for V2X communication.  (It is only applicable for intra-band multi-carrier V2X operation) |

## B.4.13 Common UE RF requirements for four uplink inter-band CA configuration

The requirements and test cases listed in Table B.4.13-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.13-1: Common UE RF requirements for a release independent four uplink inter-band CA configuration

|  |  |
| --- | --- |
| Clause | Description |
| 5.6A.1 | Channel bandwidths per operating band for CA |
| 6.2.2A | UE maximum output power for CA |
| 6.2.5A | Configured transmitted Power for CA |
| 6.3.2A | UE Minimum output power for CA |
| 6.3.3A | UE Transmit OFF power for CA |
| 6.3.4A | ON/OFF time mask for CA |
| 6.3.5A | Power control for CA |
| 6.5.1A | Frequency error for CA |
| 6.5.2A | Transmit modulation quality for CA |
| 6.6.1A | Occupied bandwidth for CA |
| 6.6.2.1A | Spectrum emission mask for CA |
| 6.6.2.3 | Adjacent Channel Leakage Ratio |
| 6.6.3.1A | Spurious Emission for CA |
| 6.6.3.2A | Spurious emission band UE co-existence for CA |
| 6.7.1A | Transmit intermodulation for CA |
| 7.3.1A | Reference sensitivity for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.7.1A | Spurious response for CA |

## B.4.14 Common UE RF requirements for operating bands for UE category 1bis

The requirements and test cases listed in Table B.4.14-1 are specified in TS 36.101 Rel-17 [2].

Table B.4.14-1: Common UE RF requirements for release independent operating bands for UE category 1bis

|  |  |
| --- | --- |
| Clause | Description |
| 5.5E | Operating bands for UE category 1bis |
| 7.3.1E | Minimum requirements (QPSK) for UE category 1bis |

Annex C (normative):  
Common Requirements for 4Rx

# C.1 Common UE RF requirements

The requirements and test cases listed in Table C.1-1 are specified in TS 36.101 Rel-17 [2].

Table C.1-1: RF requirements for 4Rx for single band

|  |  |
| --- | --- |
| Clause | Description |
| 7.3 | Reference sensitivity power level |
| 7.4 | Maximum input level |
| 7.5 | Adjacent channel selectivity |
| 7.6 | Blocking characteristics |
| 7.7 | Spurious response |
| 7.8 | Intermodulation characteristics |
| 7.9 | Spurious emissions |

The requirements and test cases listed in Table C.1-2 are specified in TS 36.101 Rel-17 [2].

Table C.1-2: RF requirements for 4Rx for CA

|  |  |
| --- | --- |
| Clause | Description |
| 6.2.5A | Configured maximum output power |
| 7.3.1A | Reference sensitivity for CA |
| 7.4.1A | Maximum input level for CA |
| 7.5.1A | Adjacent Channel Selectivity for CA |
| 7.6.1.1A | In-band blocking for CA |
| 7.6.2.1A | Out-of-band blocking for CA |
| 7.6.3.1A | Narrow band blocking for CA |
| 7.7.1A | Spurious response for CA |
| 7.8.1A | Wideband intermodulation for CA |

# C.2 Common UE demodulation and CSI requirements

The requirements and test cases listed in Table C.2-1 are specified in TS 36.101 Rel-17 [2].

Table C.2-1: UE Demodulation and CSI requirements for 4Rx for single band

|  |  |
| --- | --- |
| Clause | Description |
| 8.10.1 (NOTE) | PDSCH |
| 8.10.2 | PDCCH/PCFICH |
| 8.10.3 | PHICH |
| 8.10.4 | ePDCCH |
| 9.9 | CSI reporting for 4Rx UE |

The requirements and test cases listed in Table C.2-2 are specified in TS 36.101 Rel-17 [2].

Table C.2-2: UE Demodulation and CSI requirements for 4Rx CA/DC

|  |  |
| --- | --- |
| Clause | Description |
| 8.13 | Demodulation of PDSCH CA |
| 8.7.9 | SDR of FDD CA (4 layer MIMO) |
| 8.7.10 | SDR of TDD CA (4 layer MIMO) |
| 8.7.11 | SDR of TDD-FDD CA (4 layer MIMO) |
| 8.7.13 | SDR of FDD DC (4 layer MIMO) |
| 8.7.14 | SDR of TDD DC (4 layer MIMO) |
| 8.7.15 | SDR of TDD-FDD DC (4 layer MIMO) |
| 9.1.1.4.2 | CSI CA tests for 4Rx UE |

Annex D (normative):  
Common Requirements for performance enhancements for high speed scenario

# D.1 Common RRM requirements for performance enhancements for high speed scenario

The requirements and test cases listed in Table D.1-1 are specified in TS 36.133 Rel-17 [3].

Table D.1-1: RRM requirements for performance enhancements for high speed scenario

|  |  |
| --- | --- |
| Clause | Description |
| 4.2 | Cell Re-selection |
| 8.1.2.2 | E-UTRAN intra frequency measurements in RRC connected state |

# D.2 Common UE demodulation requirements for performance enhancements for high speed scenario

The requirements and test cases listed in Table D.2-1 are specified in TS 36.101 Rel-17 [2].

Table D.2-1: UE Demodulation requirements for performance enhancements for high speed scenario

|  |  |
| --- | --- |
| Clause | Description |
| 8.2.1.9 | FDD PDSCH |
| 8.2.2.9 | TDD PDSCH |

Annex E (normative):  
Common Requirements for 8Rx

# E.1 Common UE RF requirements

The requirements and test cases listed in Table E.1-1 are specified in TS 36.101 Rel-17 [2].

Table E.1-1: RF requirements for 8Rx

|  |  |
| --- | --- |
| Clause | Description |
| 7.3 | Reference sensitivity power level |

The requirements and test cases listed in Table E.1-2 are specified in TS 36.101 Rel-17 [2].

Table E.1-2: RF requirements for 8Rx for CA

|  |  |
| --- | --- |
| Clause | Description |
| 7.3.1A | Reference sensitivity for CA |

# E.2 Common UE demodulation and CSI requirements

The requirements and test cases listed in Table E.2-1 and Table E.2-2 are specified in TS 36.101 Rel-17 [2].

Table E.2-1: UE Demodulation and CSI requirements for 8Rx for single band

|  |  |
| --- | --- |
| Clause | Description |
| 8.14.1 | PDSCH |
| 9.12 | CSI reporting for 8Rx UE |

Table E.2-2: UE Demodulation and CSI requirements for 8Rx CA/DC

|  |  |
| --- | --- |
| Clause | Description |
| 8.14.2 | Demodulation of PDSCH CA |
| 8.7.17 | SDR of TDD CA (8 layer MIMO) |

Annex F (normative):  
Common requirements for NB-IoT or eMTC operation over NTN

# F.1 Common UE RF requirements

The requirements and test cases listed in Table F.1-1 are specified in TS 36.102 Rel-18 [6].

Table F.1-1: RF requirements for NB-IoT operation over NTN

|  |  |
| --- | --- |
| Clause | Description |
| 5.2B | Operating bands |
| 5.3B | Channel bandwidth |
| 5.4B | Channel arrangement |
| 6.1 | General transmitter characteristics |
| 6.2B | Transmit power |
| 6.3B | Output power dynamics |
| 6.4B | Transmit signal quality |
| 6.5B | Output RF spectrum emissions |
| 6.6B | Transmit intermodulation |
| 7.1 | General receiver characteristics |
| 7.2 | Diversity characteristics |
| 7.3B | Reference sensitivity power level |
| 7.4B | Maximum input level |
| 7.5B | Adjacent Channel Selectivity (ACS) |
| 7.6B | Blocking characteristics |
| 7.7B | Spurious response |
| 7.8B | Intermodulation characteristics |
| 7.9 | RX spurious emissions |

The requirements and test cases listed in Table F.1-2 are specified in TS 36.102 Rel-18 [6].

Table F.1-2: RF requirements for eMTC operation over NTN

|  |  |
| --- | --- |
| Clause | Description |
| 5.2A | Operating bands |
| 5.3A | Channel bandwidth |
| 5.4A | Channel arrangement |
| 6.1 | General transmitter characteristics |
| 6.2A | Transmit power |
| 6.3A | Output power dynamics |
| 6.4A | Transmit signal quality |
| 6.5A | Output RF spectrum emissions |
| 6.6A | Transmit intermodulation |
| 7.1 | General receiver characteristics |
| 7.2 | Diversity characteristics |
| 7.3A | Reference sensitivity power level |
| 7.4A | Maximum input level |
| 7.5A | Adjacent Channel Selectivity (ACS) |
| 7.6A | Blocking characteristics |
| 7.7A | Spurious response |
| 7.8A | Intermodulation characteristics |
| 7.9 | RX spurious emissions |

# F.2 Common RRM requirements

The requirements and test cases listed in Table F.2-1 are specified in 36.133 Rel-18 [3]. Note the requirements apply to serving cell measurements and GEO intra-frequency measurements when no satellite assistance information is provided to the UE.

T Table F.2-1: RRM requirements for NB-IoT operation over NTN

|  |  |
| --- | --- |
| Clause | Description |
| 4.6A1,2 | Cell Selection and Re-selection Requirements for UE category NB-IoT for Satellite Access |
| 6.5A2 | RRC Re-establishment for NB-IoT UEs for Satellite Access |
| 6.6A | Random Access for UE category NB1 for Satellite Access |
| 6.9A2 | RRC Connection Redirection to Non-anchor Carrier in NB-IoT for Satellite Access |
| 7.20A | UE transmit timing for NB-IoT for Satellite Access |
| 7.21A | UE timer accuracy for NB-IoT for Satellite Access |
| 7.22A | Timing Advance for NB-IoT for Satellite Access |
| 7.23A | Radio Link Monitoring for Category NB-IoT UE for Satellite Access |
| 8.14A1 | Measurements for UE category NB-IoT for Satellite Access |
| NOTE 1: If no satellite assistance information is provided for neighbor cells, the requirements in this clause for the serving cell measurement are also applicable.  NOTE 2: If no satellite assistance information is provided for neighbor cells, the intra-frequency requirements in this clause are also applicable for GEO operations. | |

The requirements and test cases listed in Table F.2-2 are specified in 36.133 Rel-18 [3]. Note the requirements apply to serving cell measurements and GEO intra-frequency measurements when no satellite assistance information is provided to the UE.

Table F.2-2: RRM requirements for eMTC operation over NTN

|  |  |
| --- | --- |
| Clause | Description |
| 4.7A1,2 | Cell Selection and Re-selection Requirements for UE category M1 |
| 5.5A | E-UTRAN Handover for Cat-M1 UEs for Satellite Access |
| 6.2.3A | Random Access Requirements for Cat-M1 UEs for Satellite Access |
| 6.7A2 | RRC Re-establishment for Cat-M1 UEs for Satellite Access |
| 6.8A2 | RRC Connection Release with Redirection for UE Category M1 for Satellite Access |
| 7.19A | Radio Link Monitoring for UE Category M1 for Satellite Access |
| 7.24A | UE transmit timing for Category M1 for Satellite Access |
| 7.27A | UE timer accuracy for category M1 for Satellite Access |
| 7.28A | Timing Advance for Category M1 for Satellite Access |
| 8.13A1,2 | Measurements for UE Category M1 for Satellite Access |
| NOTE 1: If no satellite assistance information is provided for neighbor cells, the requirements in this clause for the serving cell measurement are also applicable.  NOTE 2: If no satellite assistance information is provided for neighbor cells, the intra-frequency requirements in this clause are also applicable for GEO operations. | |

# F.3 Common UE Demodulation requirements

The requirements and test cases listed in Table F.3-1 are specified in TS 36.102 Rel-18 [6].

Table F.3-1: Demodulation requirements for NB-IoT operation over NTN

|  |  |
| --- | --- |
| Clause | Description |
| 8.3 | Demodulation performance requirements for UE category NB1 and NB2 |

The requirements and test cases listed in Table F.3-2 are specified in TS 36.102 Rel-18 [6].

Table F.3-2: Demodulation requirements for eMTC operation over NTN

|  |  |
| --- | --- |
| Clause | Description |
| 8.2 | Demodulation performance requirements for UE category M1 |

Annex G (informative):  
Change history

Table G.1: Change History

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 11-2009 | RP#46 | RP-091141 |  |  |  | TS36.307 V0.1.0 approved by RAN (Originally in R4-095022) | 0.1.0 |
| 02-2010 | R4#54 | R4-100419 |  |  |  | For release 9 version, replace sections 4 to 6 as 'Void' and add a new void section as section 7. | 0.2.0 |
| 03-2010 | RP#47 | RP-100162 |  |  |  | TS36.307 v1.0.0 for approval | 1.0.0 |
| 03-2010 | RP#47 | RP-100162 |  |  |  | Approved by RAN | 9.0.0 |
| 09-2010 | RP-49 | RP-100927 | 2 |  |  | CR LTE\_TDD\_2600\_US spectrum band definition additions to TS 36.307 V900 | 9.1.0 |
|  |  |  |  |  |  | Correction of section numbering | 9.1.1 |
| 12-2010 | RP-50 | RP-101356 | 008 |  |  | Band 42 and 43 parameters for UMTS/LTE 3500 (TDD) for TS 36.307 | 9.2.0 |
| 12-2010 | RP-50 | RP-101361 | 005 |  |  | Introduction of L-band in TS 36.307 | 9.2.0 |
| 12-2010 | RP-50 | RP-101344 | 016 |  |  | CR creating the rel-10 of the 36.307 specification | 9.3.0 |
| 12-2010 | RP-50 | RP-101356 | 012 |  |  | Band 42 and 43 parameters for UMTS/LTE 3500 (TDD) for TS 36.307 | 9.3.0 |
| 12-2010 | RP-50 |  |  |  |  | Raised to Rel-10 with no technical change | 10.0.0 |
| 01-2011 |  |  |  |  |  | Correction to history table | 10.0.1 |
| 06-2011 | RP-52 | RP-110804 | 015 |  |  | Add Expanded 1900 MHz Band (Band 25) in 36.307 | 10.1.0 |
| 06-2011 | RP-52 | RP-110812 | 022 |  |  | Add 2GHz S-Band (Band 23) in 36.307 (Rel 10) | 10.1.0 |
| 09-2011 | RP-53 | RP-111255 | 025 |  |  | Add Band 22 for LTE/UMTS 3500 (FDD) to TS 36.307 | 10.2.0 |
| 03-2012 | RP-55 | RP-120305 | 029 |  |  | Introduction of Band 26/XXVI to TS 36.307 | 11.0.0 |
| 2012-06 | RP-56 | RP-120789 | 043 |  |  | Introduction of CA\_1A-19A to TS 36.307 | 11.1.0 |
| 2012-06 | RP-56 | RP-120793 | 049 |  |  | Introduction of APAC700(FDD) into TS 36.307 Rel-11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120793 | 053 |  |  | Introduction of APAC700(TDD) into TS 36.307 Rel-11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120791 | 057 |  |  | Introduction of e850\_LB (Band 27) to TS 36.307 | 11.1.0 |
| 2012-09 | RP-57 | RP-121335 | 059 |  |  | Introduction of CA\_1A-21A to TS 36.307 | 11.2.0 |
| 2012-09 | RP-57 | RP-121295 | 070r1 |  |  | Relation between EARFCN for overlapping bands with multiple FBI indication | 11.2.0 |
| 2012-09 | RP-57 | RP-121338 | 072 |  |  | 36.307 CR for LTE\_CA\_B7 | 11.2.0 |
| 2012-09 | RP-57 | RP-121337 | 073 |  |  | TS 36.307 CR for CA\_38 | 11.2.0 |
| 2012-09 | RP-57 | RP-121327 | 074 |  |  | Introduction of CA\_B7\_B20 in 36.307 | 11.2.0 |
| 2012-09 | RP-57 | RP-121329 | 075 |  |  | Introduction of CA band combination Band3 + Band5 to TS 36.307 | 11.2.0 |
| 2012-09 | RP-57 | RP-121331 | 076 |  |  | Introduction of CA\_3A-20A to TS 36.307 | 11.2.0 |
| 2012-09 | RP-57 | RP-121334 | 077 |  |  | Add requirements for inter-band CA of B\_1-18 in TS36.307 | 11.2.0 |
| 2012-09 | RP-57 | RP-121333 | 078 |  |  | Introduction of CA\_8\_20 RF requirements into TS36.307 | 11.2.0 |
| 2012-09 | RP-57 | RP-121324 | 079 |  |  | Introduction of CA\_B3\_B7 in 36.307 | 11.2.0 |
| 2012-12 | RP-58 | RP-121890 | 086 |  |  | Introduction of CA\_4A-5A into 36.307 | 11.3.0 |
| 2012-12 | RP-58 | RP-121889 | 088 |  |  | Introduction of CA band combination Band4 + Band13 to TS 36.307 (Rel-11) | 11.3.0 |
| 2012-12 | RP-58 | RP-121896 | 091 |  |  | Introduction of Band 5 + Band 17 inter-band CA configuration into 36.307 | 11.3.0 |
| 2012-12 | RP-58 | RP-121884 | 092 |  |  | Introduction of CA\_3A-8A to TS 36.307 | 11.3.0 |
| 2012-12 | RP-58 | RP-121894 | 093 |  |  | Introduction of CA\_B5\_B12 in 36.307 | 11.3.0 |
| 2012-12 | RP-58 | RP-121887 | 095 |  |  | Introduction of CA\_4-12 into TS 36.307 (Rel-11) | 11.3.0 |
| 2012-12 | RP-58 | RP-121882 | 097 |  |  | [Rel-11] Introduction of inter-band CA\_11-18 into TS36.307 | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 099 |  |  | Release-independent implementation of carrier aggregation configuration CA\_4-7 | 11.3.0 |
| 2012-12 | RP-58 | RP-121901 | 101 |  |  | Introduction of Band 29 | 11.3.0 |
| 2012-12 | RP-58 | RP-121718 | 0102 |  |  | Introduction of CA band combination Band2 + Band17 to TS 36.307 (Rel-11) | 11.3.0 |
| 2012-12 | RP-58 | RP-121720 | 0104 |  |  | Introduction of CA band combination Band4 + Band17 to TS 36.307 (Rel-11) | 11.3.0 |
| 2013-06 | RP-60 | RP-130771 | 108 |  |  | Introduction of CA 1+8 into TS36.307(Rel-12) | 12.0.0 |
| 2013-06 | RP-60 | RP-130782 | 111 |  |  | Introduction of LTE Advanced inter-band Carrier Aggregation of Band 3 and Band 28 to TS 36.307 Rel-12 | 12.0.0 |
| 2013-06 | RP-60 | RP-130785 | 114 |  |  | Introduction of LTE Advanced inter-band Carrier Aggregation of Band 23 and Band 29 to TS 36.307 (Rel-12) | 12.0.0 |
| 2013-06 | RP-60 | RP-130779 | 117 |  |  | Introduction of LTE Advanced inter-band Carrier Aggregation of Band 3 and Band 26 to TS 36.307 (Rel-12) | 12.0.0 |
| 2013-06 | RP-60 | RP-130777 | 120 |  |  | Introduction of CA\_3A-19A to TS 36.307 | 12.0.0 |
| 2013-06 | RP-60 | RP-130783 | 123 |  |  | Introduction of CA\_19A-21A to TS 36.307 | 12.0.0 |
| 2013-06 | RP-60 | RP-130775 | 131 |  |  | Introduction of CA\_2A-13A to TS 36.307 | 12.0.0 |
| 2013-06 | RP-60 | RP-130791 | 136 |  |  | Introduction of Band 30 | 12.0.0 |
| 2013-06 | RP-60 | RP-130790 | 143 |  |  | Introduction of LTE 450 into TS 36.307 R12 | 12.0.0 |
| 2013-06 | RP-60 | RP-130787 | 150 |  |  | Introduction of CA\_4A-4A into 36.307 Rel-12 | 12.0.0 |
| 09-2013 | RP-61 | RP-131300 | 153 |  |  | 36.307 CR for LTE\_CA\_C\_B3 (Rel-12) | 12.1.0 |
| 09-2013 | RP-61 | RP-131296 | 160 |  |  | [Rel-12] Add requirements for CA\_1A-26A into TS36.307 | 12.1.0 |
| 09-2013 | RP-61 | RP-131297 | 163 |  |  | Introduction of CA\_2A-4A to TS 36.307 | 12.1.0 |
| 09-2013 | RP-61 | RP-131298 | 167 |  |  | Introduction of inter-band CA Band 2+5 | 12.1.0 |
| 12-2013 | RP-62 | RP-131965 | 173 |  |  | Introduction of CA\_23A-23A to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131946 | 178 |  |  | Introduction of CA band combination Band2 + Band12 to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131954 | 181 |  |  | Introduction of CA band combination Band12 + Band25 to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131959 | 184 |  |  | Introduction of LTE\_CA\_C\_B27 to 36.307 (Rel-12) | 12.2.0 |
| 12-2013 | RP-62 | RP-131957 | 192 |  |  | Introduction of CA\_23B to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131961 | 194 |  |  | Introduction of Intra-band non-contiguous CA in band 3 to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131950 | 200 |  |  | Introduction of CA band combination Band5 + Band25 to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131967 | 201r1 |  |  | Introducing 'General' clause with note referring to note in clause 4.4 in TS36.101, editorial corrections and modifications to Forward and Scope clauses | 12.2.0 |
| 12-2013 | RP-62 | RP-131948 | 204 |  |  | Introduction of CA band combination B5 + B7 to TS 36.307 R12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131952 | 207 |  |  | Introduction of CA band combination B7 + B28 to TS 36.307 | 12.2.0 |
| 12-2013 | RP-62 | RP-131967 | 211 |  |  | Correction to release independent specification | 12.2.0 |
| 12-2013 | RP-62 | RP-131925 | 216 |  |  | UE performance requirements in release independent specification for CA | 12.2.0 |
| 12-2013 | RP-62 | RP-131963 | 219 |  |  | Introduction of CA\_7A-7A to TS 36.307 Rel-12 | 12.2.0 |
| 03-2014 | RP-63 | RP-140371 | 235 |  |  | Release independence of Band 14 HPUE | 12.3.0 |
| 03-2014 | RP-63 | RP-140386 | 227 |  |  | Introduction of CA band combination Band 3 and Band 27 to TS 36.307 | 12.3.0 |
| 03-2014 | RP-63 | RP-140389 | 245r1 |  |  | Correction to release independent specification | 12.3.0 |
| 03-2014 | RP-63 | RP-140388 | 210r1 |  |  | Introduction of CA\_39C to TS 36.307 | 12.3.0 |
| 03-2014 | RP-63 | RP-140387 | 197r1 |  |  | Introduction of CA\_39A-41A to TS 36.307 | 12.3.0 |
| 06-2014 | RP-64 | RP-140911 | 259 |  |  | Introduction of CA band combination Band 1 and Band 5 to TS 36.307 | 12.4.0 |
| 06-2014 | RP-64 | RP-140918 | 300 |  |  | Correction of Common RRM requirements for CA in release independent specification (Rel-12) | 12.4.0 |
| 06-2014 | RP-64 | RP-140926 | 280r1 |  |  | Introduction of Band 20+32 CA | 12.4.0 |
| 06-2014 | RP-64 | RP-140931 | 265 |  |  | Introduction of CA 1+11 to 36.307 (Rel-12) | 12.4.0 |
| 06-2014 | RP-64 | RP-140933 | 275 |  |  | Introduction of CA band combination Band 4 and Band 27 to TS 36.307 | 12.4.0 |
| 06-2014 | RP-64 | RP-140938 | 291 |  |  | Introduction of CA\_2A-2A to TS 36.307 Rel-12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140940 | 319 |  |  | Introduction of LTE\_CA\_NC\_B42 into 36.307 | 12.4.0 |
| 06-2014 | RP-64 | RP-140942 | 253 |  |  | Introduction of CA band combination Band 3 and Band 27 to TS 36.307 | 12.4.0 |
| 06-2014 | RP-64 | RP-140942 | 340 |  |  | Introduction of CA band combination Band 1 and Band 20 to TS 36.307 | 12.4.0 |
| 06-2014 | RP-64 | RP-140943 | 347 |  |  | Introduction of CA band combination CA\_41D into TS 36.307 (Rel-12) | 12.4.0 |
| 09-2014 | RP-65 | RP-141110 | 0388r1 |  |  | [Rel-12] Introduction of inter-band CA\_18-28 into TS36.307 | 12.5.0 |
| 09-2014 | RP-65 | RP-141200 | 0366r1 |  |  | Introduction of CA\_B1\_B3\_B19 into TS 36.307 (Rel-12) | 12.5.0 |
| 09-2014 | RP-65 | RP-141205 | 0363r1 |  |  | Introduction of CA\_B1\_B3 into TS 36.307 (Rel-12) | 12.5.0 |
| 09-2014 | RP-65 | RP-141332 | 0429r1 |  |  | Introduction of CA\_1A-7A into 36.307 (Rel -12) | 12.5.0 |
| 09-2014 | RP-65 | RP-141340 | 0376r1 |  |  | Introduction of CA\_B1\_B5\_B7 into TS 36.307 (Rel-12) | 12.5.0 |
| 09-2014 | RP-65 | RP-141467 | 0432 |  |  | Introduction of 3 DL CA for Band 1+7+20 | 12.5.0 |
| 09-2014 | RP-65 | RP-141527 | 415r1 |  |  | CR for 36.307 on CA UE performance requirement in Rel-12 | 12.5.0 |
| 09-2014 | RP-65 | RP-141551 | 360 |  |  | Introduction of CA 8+11 to 36.307 (Rel-12) | 12.5.0 |
| 09-2014 | RP-65 | RP-141552 | 379 |  |  | Introduction of CA\_41A-42A to TS 36.307 | 12.5.0 |
| 09-2014 | RP-65 | RP-141553 | 381 |  |  | Introduction of a new bandwidth combination set for CA\_25A-25A into 36.307 | 12.5.0 |
| 09-2014 | RP-65 | RP-141554 | 418r1 |  |  | Introduction of requirements for 2DL inter-band carrier aggregation (FDD) and 2DL fallback | 12.5.0 |
| 09-2014 | RP-65 | RP-141554 | 421 |  |  | Introduction of requirements for 3DL inter-band carrier aggregation including Band 30 | 12.5.0 |
| 09-2014 | RP-65 | RP-141555 | 384 |  |  | Introduction of 3 Band Carrier Aggregation of Band 1,Band 3 and Band 5 to TS 36.307(Rel.12) | 12.5.0 |
| 09-2014 | RP-65 | RP-141556 | 357r1 |  |  | Introduction of 3 Band Carrier Aggregation (3DL/1UL) of Band 1, Band 3 and Band 8 to TS 36.307 | 12.5.0 |
| 09-2014 | RP-65 | RP-141558 | 402 |  |  | Introduction of CA band combination Band 1, Band 3 and Band 20 to TS 36.307 | 12.5.0 |
| 09-2014 | RP-65 | RP-141560 | 352 |  |  | Introduction of new CA\_40C bandwidth combination set into 36.307 | 12.5.0 |
| 09-2014 | RP-65 | RP-141561 | 354 |  |  | CR to 36.307 Rel-12: Introduction of CA\_41C-41A and CA\_41A-41C | 12.5.0 |
| 12-2014 | RP-66 | RP-142142 | 440 |  |  | UE RF requirements in the release independent spec | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 444 |  |  | Revision of common RRM requirements for release independent specification | 12.6.0 |
| 12-2014 | RP-66 | RP-142182 | 448 |  |  | [Rel-12] Introduction of inter-band CA\_1-28 into TS36.307 | 12.6.0 |
| 12-2014 | RP-66 | RP-142189 | 455 |  |  | CR for TR 36.307: LTE\_CA\_B5\_B13 | 12.6.0 |
| 12-2014 | RP-66 | RP-142190 | 458r2 |  |  | Introduction of additional band combinations for 3DL inter-band CA | 12.6.0 |
| 03-2015 | RP-67 | RP-150387 | 463 |  |  | R4-73AH-0113: Correction of UE RF requirements for dual uplik to TS 36.307 Rel-12 | 12.7.0 |
| 03-2015 | RP-67 | RP-150392 | 468 |  |  | CR for 36.307 on CA UE performance requirement in Rel-12 | 12.7.0 |
| 03-2015 | RP-67 | RP-150387 | 469 |  |  | Further revision of RSRP requirement for 36.307 release 12 | 12.7.0 |
| 05-2015 | RP-68 | RP-151068 | 0511r1 |  |  | Introduction of CA\_3A-40A to TS 36.307 R13 | 13.0.0 |
| 05-2015 | RP-68 | RP-151070 | 0513r1 |  |  | Introduction of CA\_3A-40C to TS 36.307 R13 | 13.0.0 |
| 05-2015 | RP-68 | RP-150958 | 461r1 |  |  | Introduction of dual uplink CA into 36.307 | 13.0.0 |
| 05-2015 | RP-68 | RP-150968 | 499r2 |  |  | Release independence CR for 2DL inter-band CA Rel-13 | 13.0.0 |
| 05-2015 | RP-68 | RP-150972 | 503r1 |  |  | Release independence CR for 3DL inter-band CA Rel-13 | 13.0.0 |
| 05-2015 | RP-68 | RP-150974 | 506r1 |  |  | Release independence CR for 4DL inter-band CA Rel-13 | 13.0.0 |
| 05-2015 | RP-68 | RP-150975 | 509 |  |  | Introduction of non-contiguous Carrier Aggregation (CA) in Band 42 for 3DL | 13.0.0 |
| 05-2015 | RP-68 | RP-151006 | 514 |  |  | Introduction of CA\_42D to TS 36.307 | 13.0.0 |
| 09-2015 | RP-69 | RP-151501 | 0520r1 |  |  | Introduction of finished 4DL inter-band CAs to TS 36.307 | 13.1.0 |
| 09-2015 | RP-69 | RP-151503 | 0526 |  |  | [Rel-13] Introduction of dual uplink CA into 36.307 | 13.1.0 |
| 09-2015 | RP-69 | RP-151499 | 0538 |  |  | Rel-13 3DL combinations | 13.1.0 |
| 09-2015 | RP-69 | RP-151201 | 0543 |  |  | Introduction of CA\_7A-40A and CA\_7A-40C to TS 36.307 R13 | 13.1.0 |
| 10-2015 |  |  |  |  |  | Correction of the release in the cover page | 13.1.1 |
| 12-2015 | RP-70 | RP-152158 | 0543a |  |  | Release independent requirements for CA\_42E (Rel-13) | 13.2.0 |
| 12-2015 | RP-70 | RP-152160 | 0549 |  |  | Introduction of 4DL NC CA in band42 in 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152157 | 0561 |  |  | Introducing B20 + B67 CA into TS 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152168 | 0562 |  |  | Introduction of intra-band CA\_8B to TS 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152171 | 0580 |  |  | Introduction of Band 65 | 13.2.0 |
| 12-2015 | RP-70 | RP-152167 | 0589 |  |  | Introduction of intra-band CA\_5B to TS 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152169 | 0590 |  |  | Introduction of intra-band NC CA\_5A-5A to TS 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152166 | 0596 |  |  | Introduction of 3DL/3UL Inter-band CA in TS36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152163 | 0598 |  |  | Introduction of 5DL/1UL CA combinations into TS 36.307 (Rel-13) | 13.2.0 |
| 12-2015 | RP-70 | RP-152162 | 0604 |  |  | Introduction of finished 4DL inter-band CAs to TS 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152173 | 0612 |  |  | Introduction of 1447-1467MHz Band into 36.307 | 13.2.0 |
| 12-2015 | RP-70 | RP-152156 | 0616 |  |  | Rel-13 2DL combinations | 13.2.0 |
| 12-2015 | RP-70 | RP-152161 | 0620 |  |  | Rel-13 3DL combinations | 13.2.0 |
| 12-2015 | RP-70 | RP-152172 | 0628 |  |  | Introduction of Band 66 | 13.2.0 |
| 12-2015 | RP-70 | RP-152159 | 0632 |  |  | Introduction of intra-band non-contiguous CA in Band 41 for 4DL | 13.2.0 |
| 12-2015 | RP-70 | RP-152165 | 0634 |  |  | Introduction of 2 UL and 3 DL mixed inter/intra cases without MSD into 36.307 Rel-13 | 13.2.0 |
| 03/2016 | RP-71 | RP-160480 | 0655 |  | B | Rel-13 3DL combinations | 13.3.0 |
| 03/2016 | RP-71 | RP-160481 | 0642 |  | B | Introduction of completed R13 4DL inter-band CA's to TS 36.307 | 13.3.0 |
| 03/2016 | RP-71 | RP-160482 | 0651 |  | B | Introduction of 5DL/1UL CA combinations into TS 36.307 (Rel-13) | 13.3.0 |
| 03/2016 | RP-71 | RP-160483 | 0647 |  | B | Introduction of Band 68 | 13.3.0 |
| 06/2016 | RP-72 | RP-161142 | 0682 | 1 | F | CR TS 36.307 REL-13 | 13.4.0 |
| 06/2016 | RP-72 | RP-161142 | 0691 | 1 | F | Correction of RRM multiple uplink requirements and test cases in 36.307 | 13.4.0 |
| 09/2016 | RP-73 | RP-161628 | 0693 |  | A | Release 13 36.307 CAT A CR to make Band 41 power class 2 release independent | 13.5.0 |
| 09/2016 | RP-73 | RP-161613 | 0705 |  | B | CR for 4Rx requirements for release independent in Rel-13 | 13.5.0 |
| 09/2016 | RP-73 | RP-161628 | 0692 | 1 | F | Release 14 36.307 CR to make Band 41 power class 2 release independent | 14.0.0 |
| 09/2016 | RP-73 | RP-161617 | 0703 | 1 | B | Introduction of V2V operating bands in TS36.307 Rel-14 | 14.0.0 |
| 12/2016 | RP-74 | RP-162387 | 0707 |  | A | Introduction of B46 DL 10 MHz release independent feature | 14.1.0 |
| 12/2016 | RP-74 | RP-162398 | 0711 | 1 | A | Addition of CA bandwidth Class F | 14.1.0 |
| 12/2016 | RP-74 | RP-162459 | 0716 | 2 | A | Correction to UE category applicability | 14.1.0 |
| 12/2016 | RP-74 | RP-162390 | 0721 | 1 | A | Addition of UE category 0 and M1 to release independence specification | 14.1.0 |
| 12/2016 | RP-74 | RP-162407 | 0722 | - | A | Introduction of new bands for NB-IoT in 36.307 | 14.1.0 |
| 03/2017 | RP-75 | RP-170559 | 0733 | - | B | CR on 36.307 for V2X multi-carrier operation | 14.2.0 |
| 06/2017 | RP-76 | RP-171291 | 0749 | 1 | F | Cleanup of TS 36.307 | 14.3.0 |
| 09/2017 | RP-77 | RP-171943 | 4354 |  | F | CR for adding NB-IoT performance requirements in 36.307 in Rel-14 | 14.4.0 |
| 09/2017 | RP-77 | RP-171953 | 4358 |  | B | CR on TS36.307 in rel-14 for V2X release independents | 14.4.0 |
| 09/2017 | RP-77 | RP-171973 | 4359 |  | A | CR for adding overlapping band B66 in 36.307 in Rel-14 | 14.4.0 |
| 09/2017 | RP-77 | RP-172045 | 4361 |  | B | Additional LTE bands for UE category M1 and/or NB1 in Rel-15 | 14.4.0 |
| 09/2017 | RP-77 | RP-172052 | 4363 |  | B | Additional LTE bands for UE category M2 and/or NB2 in Rel-14 | 14.4.0 |
| 09/2017 | RP-77 | RP-171953 | 4355 |  | B | CR on 36.307 on introduction of V2X operating bands in Rel-15 | 15.0.0 |
| 09/2017 | RP-77 | RP-172053 | 4364 |  | B | Additional LTE bands for UE category M2 and/or NB2 in Rel-15 | 15.0.0 |
| 2018-03 | RAN#79 | RP-180288 | 4371 |  | A | Addition of missing features for TS 36.307 REL-15 | 15.1.0 |
| 2018-03 | RAN#79 | RP-180276 | 4365 | 1 | B | Introduction of 4UL CA into TS36.307 | 15.1.0 |
| 2018-06 | RAN#80 | RP-181100 | 4381 |  | B | TS 36.307 Rel-15 | 15.2.0 |
| 2018-06 | RAN#80 | RP-181097 | 4389 | 1 | A | TS 36.307 big CR for introduction new band support for 4Rx antenna ports R15 | 15.2.0 |
| 2018-06 | RAN#80 | RP-181087 | 4391 | 1 | A | TS 36.307 big CR for introduction new band support for 8Rx antenna ports R15 | 15.2.0 |
| 2018-06 | RAN#80 | RP-181110 | 4394 |  | A | CR for adding LAA SDR tests for release independent R15 | 15.2.0 |
| 2018-06 | RAN#80 | RP-181095 | 4400 |  | B | Introduction of 3UL CA into TS36.307 | 15.2.0 |
| 2018-06 | RAN#80 | RP-181096 | 4402 |  | A | CR on new V2X band combinations and eV2X feature in TS36.307 rel-15 | 15.2.0 |
| 2018-06 | RAN#80 | RP-181093 | 4403 |  | B | Introduction of 1UL and more than 5DL CA into 36.307 | 15.2.0 |
| 2018-09 | RAN#81 | RP-181916 | 4406 | 2 | A | CR of release independent requirements for LTE Carrier Aggregation beyond 5 carriers (TS 36.307 Rel-15) | 15.3.0 |
| 2018-12 | RAN#82 | RP-182377 | 4409 | 1 | A | CR of adding B65 for NB1 | 15.4.0 |
| 2018-12 | RAN#82 | RP-182378 | 4411 | 1 | A | CR of adding B65 for NB2 | 15.4.0 |
| 2019-06 | RAN#84 | RP-191266 | 4414 |  | A | CR: Addition of 8Rx performance requirements for release independent | 15.5.0 |
| 2019-09 | RAN#85 | RP-192044 | 4433 | 2 | B | CR of adding LTE B42/B43 for UE category NB2 in R16 | 15.6.0 |
| 2019-09 | RAN#85 | RP-192045 | 4427 |  | B | Introduction PC2 for HD-FDD UE category M1 and M2 for TS 36.307 | 16.0.0 |
| 2019-12 | RAN#86 | RP-193044 | 4439 | 3 | B | CR for REL-16 TS36.307 for adding B40 to UE category 1bis | 16.1.0 |
| 2020-06 | RAN#88 | RP-200961 | 4442 |  | F | Adding UE category NB1 supporting LTE band 42/43 | 16.2.0 |
| 2020-06 | RAN#88 | RP-200961 | 4441 | 1 | B | CR for REL-16 TS36.307 for adding B34 to UE category 1bis | 16.2.0 |
| 2021-03 | RAN#91 | RP-210110 | 4446 |  | A | CR of adding LTE B24 for UE category NB1 in R17 | 16.3.0 |
| 2021-03 | RAN#91 | RP-210110 | 4449 |  | A | CR of adding LTE B24 for UE category NB2 in R17 | 16.3.0 |
| 2021-09 | RAN#93 | RP-211919 | 4454 |  | A | CR on adding B24 for Cat-M1 36.307\_16A | 16.4.0 |
| 2021-09 | RAN#93 | RP-211919 | 4456 |  | A | CR on adding B24 for Cat-M2 36.307\_16A | 16.4.0 |
| 2021-09 | RAN#93 | RP-211916 | 4459 |  | A | CR Release independence aspect of 6-band LTE CA R16 CATA | 16.4.0 |
| 2022-03 | SA#95 |  |  |  |  | Update to Rel-17 version (MCC) | 17.0.0 |
| 2022-06 | RAN#96 | RP-221669 | 4466 |  | A | CR on adding B48 for M1/M2/NB1/NB2 | 17.1.0 |
| 2022-09 | RAN97-e | RP-222025 | 4472 |  | F | CR to TS 36.307: correction of the release version, Rel-17 | 17.2.0 |
| 2022-12 | RAN98-e | RP-223546 | 4473 |  | B | CR to TS 36.307: release independence requirements introduction for NTN IoT, Rel-17  NOTE: This CR introduced Annex F, which means the change history needed to be changed to Annex G as it should be the last Annex in the specification | 17.3.0 |
| 2023-03 | RAN#99 | RP-230524 | 4478 |  | A | CR for TS 36\_307 Support of M1 for B54\_R17A | 17.4.0 |
| 2023-03 | RAN#99 | RP-230524 | 4482 |  | A | CR for TS 36\_307 Support of M2 for B54\_R17A | 17.4.0 |
| 2023-03 | RAN#99 | RP-230524 | 4485 |  | A | CR for TS 36\_307 Support of NB1NB2 for B54\_R17A | 17.4.0 |

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| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2023-03 | RAN#99 | RP-230526 | 4486 |  | A | CR to TS 36.307: release independence requirements introduction for IoT NTN, Rel-18 | 18.0.0 |
| 2023-03 | RAN#99 | RP-230524 | 4487 |  | A | CR related to Introduction of support of NB1/NB2 for LTE TDD Band 54\_R18A | 18.0.0 |
| 2023-03 | RAN#99 | RP-230524 | 4488 |  | A | CR related to Introduction of support of M1 for LTE TDD Band 54\_R18A | 18.0.0 |
| 2023-03 | RAN#99 | RP-230524 | 4489 |  | A | CR related to Introduction of support of M2 for LTE TDD Band 54\_R18A | 18.0.0 |
| 2023-06 | RAN#100 | RP-231364 | 4491 |  | A | CR to TS 36.307 (Rel-18): release independence RRM requirements for IoT NTN | 18.1.0 |
| 2023-09 | RAN#101 | RP-232510 | 4493 |  | F | CR to 36.307: Release independent for IoT-NTN UE demodulation requirements (Rel-18) | 18.2.0 |
| 2023-12 | RAN#102 | RP-233358 | 4497 | 1 | B | CR for 36.307 B106 and B8 overlapping bands | 18.3.0 |