**3GPP TSG-RAN4 Meeting #95-e *R4-2008557***

**Online, , 25th May 2020 - 5th Jun 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **36.133** | **CR** | **6846** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Updates to general section for NR-U in 36.133 |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | RAN WG4 |
|  |  |
| ***Work item code:*** | NR\_unlic-Core |  | ***Date:*** | 2020-06-1 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Requirements for general sections 1-3 needs to be specified for NR-U |
|  |  |
| ***Summary of change:*** | Add CCA abbreviation for clear channel assignmentImplement agreement from RAN4#94bis :* + Assume by default that requirements do not apply to NR-U unless explicitly stated
 |
|  |  |
| ***Consequences if not approved:*** | EN-DC and interRAT mobility to SA NR-U cells is not specified as CCA will be used in NR-U RRM requirements in 36.133 |
|  |  |
| ***Clauses affected:*** | 2,3.3, 3.6.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Change 1 and 3 are added on top of endorsed CR R4-2005362 |
|  |  |
| ***This CR's revision history:*** |  |

Change 1

# 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 TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode"

[2] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".

[3] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures"

[4] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer; Measurements"

[5] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception"

[6] 3GPP TS 25.302: "Services provided by the Physical Layer".

[7] 3GPP TS 25.331: "RRC Protocol Specification".

[8] 3GPP TS 45.008: "Radio subsystem link control".

[9] 3GPP TS 45.005: "Radio transmission and reception".

[10] 3GPP TS 45.010: "Radio subsystem synchronization".

[11] 3GPP2 C.S0024-B: "cdma2000 High Rate Packet Data Air Interface Specification".

[12] 3GPP2 C.S0002-D: "Physical Layer Standard for cdma2000 Spread Spectrum Systems - Release A".

[13] 3GPP2 C.S0033-B: "Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Terminal".

[14] 3GPP2 C.S0011-C: "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations".

[15] 3GPP2 C.S0005-D: Upper Layer (Layer 3) Signaling Specification for cdma2000 Spread Spectrum Systems

[16] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation”

[17] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[18] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".

[19] 3GPP TS 25.123: "Requirements for Support of Radio Resource Management (TDD)".

[20] 3GPP TS 25.214: "Physical layer procedures (FDD)".

[21] 3GPP TS 36. 212 "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

[22] 3GPP TS 36.302: "Evolved Universal Terrestrial Radio Access (E-UTRA); Services provided by the physical layer".

[23] 3GPP TS 36.521-3: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Radio Resource Management conformance testing".

[24] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

[25] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2"

[26] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[27] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2"

[28] 3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP)".

[29] 3GPP TS 25.101: "UE Radio transmission and reception (FDD)".

[30] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".

[31] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

[32] IEEE Standard 802.11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.

[33] 3GPP TS 23.303: "Technical Specification Group Services and System Aspects; Proximity-based services (ProSe); Stage 2".

[34] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[35] 3GPP TS 36.171: " Requirements for Support of Assisted Global Navigation Satellite System (A-GNSS)".

[36] 3GPP TS 36.305: " Stage 2 functional specification of User Equipment (UE) positioning in E-UTRAN".

[37] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".

[38] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[39] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[40] 3GPP TS 37.340: “Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity”, Stage 2.

[41] 3GPP TS 38.101: "NR; User Equipment (UE) radio transmission and reception".

[42] 3GPP TS 38.211: "NR; Physical channels and modulation”.

[43] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[44] 3GPP TS 38. 212 "NR; Multiplexing and channel coding".

[45] 3GPP TS 38.202: "NR; Physical layer services provided by the physical layer".

[46] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[47] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".

[48] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[49] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".

[50] 3GPP TS 38.133: "NR; Requirements for support of radio resource management "

[51] 3GPP TS 38.214: " New Radio (NR); Physical layer procedures".

[52] 3GPP TS 38.101-1: “NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone”.

[53] 3GPP TS 38.101-2: “NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone”.

[54] 3GPP TS 38.101-3: “NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios”.

[55] 3GPP TS 38.101-4: “NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements”.

[56] 3GPP TS 24.368: “Non-Access Stratum (NAS) configuration Management Object (MO)”

[57] 3GPP TS 37.213: “Physical layer procedures for shared spectrum channel access”

Change 2

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [26] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [26].

1x RTT CDMA2000 1x Radio Transmission Technology

ABS Almost Blank Subframe

ARQ Automatic Repeat Request

AP Access Point

AWGN Additive White Gaussian Noise

BCCH Broadcast Control Channel

BCH Broadcast Channel

CA Carrier Aggregation

CC Component Carrier

CCA Clear Channel Assessment

CCCH SDU Common Control Channel SDU

CE Coverage Enhancement

CGI Cell Global Identifier

CPICH Common Pilot Channel

CPICH Ec/No CPICH Received energy per chip divided by the power density in the band

CRS Cell-specific Reference Signals

C-RNTI Cell RNTI

CSI Channel-State Information

CSI-RS CSI Reference Signal

DAPS Dual Active Protocol Stack

DC Dual Connectivity

DCCH Dedicated Control Channel

DL Downlink

DMTC Discovery signal Measurement Timing Configuration

DRX Discontinuous Reception

DTCH Dedicated Traffic Channel

DUT Device Under Test

E-CID Enhanced Cell-ID (positioning method)

ECGI Evolved CGI

eDRX\_IDLE Extended IDLE-mode DRX

eDRX\_CONN Extended CONNECTED-mode DRX

eNB E-UTRAN NodeB

EN-DC E-UTRA-NR Dual Connectivity

E-SMLC Enhanced Serving Mobile Location Centre

E-UTRA Evolved UTRA

E-UTRAN Evolved UTRAN

FDD Frequency Division Duplex

FS3 Frame Structure type 3

GERAN GSM EDGE Radio Access Network

GNSS Global Navigational Satellite System

GSM Global System for Mobile communication

HARQ Hybrid Automatic Repeat Request

HD-FDD Half-Duplex FDD

HO Handover

HRPD High Rate Packet Data

IDC In-Device Coexistence

IEEE Institute of Electrical and Electronics Engineers

LBT Listen before talk

LPP LTE Positioning Protocol

LWA LTE-WLAN Aggregation

MAC Medium Access Control

MCG Master Cell Group

MeNB Master eNB

MBMS Multimedia Broadcast Multicast Service

MBSFN Multimedia Broadcast multicast service Single Frequency Network

MBSFN ABS MBSFN Almost Blank Subframe

MDT Minimization of Drive Tests

MGRP Measurement Gap Repetition Period

MIB Master Information Block

MPDCCH MTC Physical Downlink Control Channel

NE-DC NR-E-UTRA Dual Connectivity

NG-RAN NG Radio Access Network

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NR New Radio

NSA Non-standalone

NPBCH Narrowband Physical Broadcast CHannel

NPDCCH Narrowband Physical Downlink Control CHannel

NPDSCH Narrowband Physical Downlink Shared CHannel

NPRACH Narrowband Physical Random Access CHannel

NPUSCH Narrowband Physical Uplink Shared CHannel

NPSS Narrowband Primary Synchronization Signal

NRS Narrowband Refernce Signal

NRSRP Narrowband Reference Signal Received Power

NRSRQ Narrowband Reference Signal Received Quality

NSCH Narrowband Synchronization Channel

NSSS Narrowband Secondary Synchronization Signal

OCNG OFDMA Channel Noise Generator

OFDM Orthogonal Frequency Division Multiplexing

OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference of Arrival

PBCH Physical Broadcast Channel

P-CCPCH Primary Common Control Physical Channel

PCell Primary Cell

PCFICH Physical Control Format Indicator CHannel

PDCCH Physical Downlink Control CHannel

PDSCH Physical Downlink Shared CHannel

PHICH Physical Hybrid-ARQ Indicator CHannel

PLMN Public Land Mobile Network

PMCH Physical Multicast Channel

PRACH Physical Random Access CHannel

ProSe Proximity-based Services

PRS Positioning Reference Signal

PSBCH Physical Sidelink Broadcast CHannel

PSCCH Physical Sidelink Control Channel

PSCell Primary SCell

PSS Primary Synchronization SignalPSSCH Physical Sidelink Shared CHannel

psTAG Primary Secondary Timing Advance Group

pTAG Primary Timing Advance Group

PTW Paging Time Window

PUCCH Physical Uplink Control CHannel

PUSCH Physical Uplink Shared Channel

RS-SINR Reference Signal Signal to Noise and Interference RatioRSCP Received Signal Code Power

RSRP Reference Signal Received Power

RSRQ Reference Signal Received Quality

RSSI Received Signal Strength Indicator

RSTD Reference Signal Time Difference

QAM Quadrature Amplitude Modulation

RACH Random Access Channel

RAT Radio Access Technology

RNC Radio Network Controller

RNTI Radio Network Temporary Identifier

RRC Radio Resource Control

RRM Radio Resource Management

SCE Small Cell Enhancement

SCH Synchronization Channel

SCell Secondary Cell

SCG Secondary Cell GroupSDU Service Data Unit

SCS Subcarrier spacing

SeNB Secondary eNB

SFN System Frame Number

SI System Information

SIB System Information Block

SLSS SideLink Synchronization Sequence

SON Self Optimized Network

SPDCCH Short Physical Downlink Control channel

SPUCCH Short Physical Uplink Control channel

SRS Sounding Reference Signal

SS-RSRP Synchronization Signal based Reference Signal Received Power

SS-RSRQ Synchronization Signal based Reference Signal Received Quality

SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSS Secondary Synchronization Signal

SSTD SFN and subframe time difference

sTAG Secondary Timing Advance Group

TAG Timing Advance Group

TDD Time Division Duplex

TP Transmission Point

TTI Transmission Time Interval

UE User Equipment

UL Uplink

UMTS Universal Mobile Telecommunication System

UTRA Universal Terrestrial Radio Access

UTRAN Universal Terrestrial Radio Access Network

V2V Vehicle to Vehicle

V2X Vehicle to Everything

WLAN Wireless Local Area Network

WB-RSRQ Wide Bandwith RSRQ

Change 3

### 3.6.1 Applicability of requirements in this specification version

In this specification,

- ‘cell’, ‘PCell’, ‘PSCell’ and ‘SCell’ refer to E-UTRA cell, E-UTRA PCell, E-UTRA PSCell and E-UTRA SCell, respectively,

- NR cells are referred to as ‘NR cell’, ‘NR PCell’, ‘NR PSCell’ and ‘NR SCell’,

- ‘dual connectivity’ refers to Intra-E-UTRA dual connectivity,

- E-UTRA-NR dual connectivity or EN-DC refer to when E-UTRA is the master,

- NR-E-UTRA dual connectivity or NE-DC refer to when NR is the master.

- The requirements for TDD-FDD carrier aggregation are specified for two downlink and one uplink component carriers. The requirements are specified for both cases when the PCell belongs to TDD or FDD.

- All the requirements for intra-band contiguous and non-contiguous CA apply under the assumption of the same uplink-downlink and special subframe configurations [16] in the PCell and SCell.

- All the requirements for inter-band CA apply for the same uplink-downlink and special subframe configurations [16] in the PCell and SCell. Different uplink-downlink and special subframe configurations [16] in the PCell and SCell are supported for inter-band CA for UEs which:

- do not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and

- are compliant to the requirements specified in TS 36.101 for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx.

- All the inter-frequency requirements and requirements for measurements on deactivated carrier apply for the same uplink-downlink and special subframe configurations [16] in the PCell and SCell. Different uplink-downlink and special subframe configurations [16] in the PCell and SCell are supported for inter-frequency for UEs which:

- do not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and are compliant to the requirements specified in TS 36.101 for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx.

- Requirements for E-UTRA carrier aggregation are applicable for the CA capable UE which has been configured with at least one downlink SCell, but:

- up to four downlink CCs intra-band contiguous and up to three downlink CCs inter-band and one uplink CC for carrier aggregation, or

- up to three downlink CCs intra-band contiguous and up to four downlink CCs inter-band and one uplink CC for carrier aggregation, or

- up to four downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or

- up to five downlink CCs and up to two uplink CCs for intra-band contiguous carrier aggregation, or

- up to four downlink CCs and one uplink CCs for inter-band carrier aggregation, or

- up to two downlink/uplink CCs intra-band contiguous and one downlink/uplink inter-band carrier aggregation, or

- up to two downlink CCs intra-band contiguous and up to three downlink inter-bands and up to two uplink CCs for inter-band carrier aggregation, or

- up to two downlink CCs intra-band non-contiguous and up to three downlink inter-bands and up to two uplink CCs for inter-band carrier aggregation, or

- up to three downlink CCs intra-band contiguous and one downlink intra-band non-contiguous and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous per sub-blocks and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous and three downlink CCs intra-band contiguous per sub-block and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two downlink CCs intra-band contiguous and three down link CCs inter-band and one uplink CC for carrier aggregation, or

- two downlink CCs intra-band contiguous and two downlink CCs intra-band contiguous and one downlink CC inter-band and one uplink CC for carrier aggregation, or

- up to two downlink CCs and up to two uplink CCs for intra-band non-contiguous carrier aggregation, or

- up to two downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or

- up to two downlink CCs intra-band contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or

- up to two downlink CCs intra-band non-contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or

- up to two downlink CCs and one uplink CC for intra-band non-contiguous carrier aggregation.

- Requirements for E-UTRA carrier aggregation for discovery signal measurements are applicable for CA capable UE which has been configured with at least one downlink SCell, but:

- up to four downlink CCs intra-band contiguous and up to three downlink CCs inter-band and one uplink CC for carrier aggregation, or

- up to three downlink CCs intra-band contiguous and up to four downlink CCs inter-band and one uplink CC for carrier aggregation, or

- up to four downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or

- up to five downlink CCs and up to two uplink CCs for intra-band contiguous carrier aggregation, or

- up to four downlink CCs and up to one uplink CCs for inter-band carrier aggregation, or

- up to two downlink/uplink CCs intra-band contiguous and one downlink/uplink inter-band carrier aggregation, or

- up to two downlink CCs intra-band contiguous and up to three downlink inter-band and up to two uplink CCs for inter-band carrier aggregation, or

- up to two downlink CCs intra-band non-contiguous and up to three downlink inter-band and up to two uplink CCs for inter-band carrier aggregation, or

- up to three downlink CCs intra-band contiguous and one downlink intra-band non-contiguous and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous per sub-blocks and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous and three downlink CCs intra-band contiguous per sub-block and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two downlink CCs intra-band contiguous and three down link CCs inter-band and one uplink CC for carrier aggregation, or

- two downlink CCs intra-band contiguous and two downlink CCs intra-band contiguous and one downlink CC inter-band and one uplink CC for carrier aggregation, or

- up to two downlink CCs and up to two uplink CCs for intra-band non-contiguous carrier aggregation, or

- up to two downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or

- up to two downlink CCs intra-band contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or

- up to two downlink CCs intra-band non-contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or

- up to two downlink CCs and one uplink CC for intra-band non-contiguous carrier aggregation.

- Requirements for E-UTRA carrier aggregation, where the PCell is FDD PCell or TDD PCell and at least one downlink SCell follows the frame structure 3 and no UL SCell following the frame structure type 3 [16], are applicable for the CA capable UE, which has been configured with at least one downlink SCell but:

- up to four downlink CCs intra-band contiguous and up to three downlink CCs inter-band and one uplink CC for carrier aggregation, or

- up to three downlink CCs intra-band contiguous and up to four downlink CCs inter-band and one uplink CC for carrier aggregation, or

- up to five downlink CCs and up to two uplink CCs for inter-band carrier aggregation.

- Requirements for E-UTRA carrier aggregation, where the PCell is FDD PCell or TDD PCell, and at least one downlink SCell and one uplink SCell follow the frame structure type 3 [16], are applicable for the CA capable UE, which has been configured with at least one downlink SCell and at least one uplink SCell but:

- up to five downlink CCs and two uplink CCs for inter-band carrier aggregation.

- The requirements for UE configured with eDRX\_CONN cycle do not apply for CA requirements and dual connectivity requirements.

**-** The requirements for a UE category 0 are derived assuming UE category 0 [31] and a single antenna receiver.

- The requirements for UE category M1 are derived assuming: DL Category M1 and Uplink Category M1, operation in any LTE system bandwidth but with a channel bandwidth of 1.4 MHz and transmission bandwidth of 6 PRBs in downlink and uplink, and a single antenna receiver. DL UE category M1 and UL UE category M1 are defined in TS 36.306 [31].

- The requirements for normal coverage in idle mode shall apply provided the UE category M1 is with the radio condition that SCH Ês/Iot≥-6 dB and CRS Ês/Iot ≥-6 dB.

- The requirements for enhanced coverage in idle mode shall apply provided the UE category M1 is capable of ce-ModeB [2] and is with the radio condition that SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB.

- The requirements for CEMode A shall apply provided the UE category M1 is configured with CEMode A, SCH Ês/Iot ≥ -6 dB and CRS Ês/Iot ≥ -6 dB. The CEMode A and the number of repetition levels for different physical channels are defined in TS 36.213 [3].

- The requirements for CEMode B shall apply provided the UE category M1 is configured with CEMode B, SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB. The CEMode B and the number of repetition levels for different physical channels are defined in TS 36.213 [3].

- The requirements for CEMode B shall apply provided the UE category M1 is configured with CEMode A and capable of ce-ModeB [2], -15 dB ≤ SCH Ês/Iot ≤ -6 dB and -15 dB ≤ CRS Ês/Iot ≤ -6 dB.

- The requirement for UE category M2 are derived assuming downlink category M2 and uplink category M2, operation in any LTE system bandwidth but with a channel bandwidth not exceeding 5MHz, transmission bandwidth not exceeding 24RB in downlink and 5MHz in uplink, and a single antenna receiver. DL UE category M2 and UL UE category M2 are defined in TS 36.306 [31].

- The requirements for normal coverage in idle mode shall apply provided the UE category M2 is with the radio condition that SCH Ês/Iot ≥ -6 dB and CRS Ês/Iot ≥ -6 dB.

- The requirements for enhanced coverage in idle mode shall apply provided the UE category M2 is capable of ce-ModeB [2] and is with the radio condition that SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB.

- The requirements for CEMode A shall apply provided the UE category M2 is configured with CEMode A, SCH Ês/Iot ≥ -6 dB and CRS Ês/Iot ≥ -6 dB. The CEMode A and the number of repetition levels for different physical channels are defined in TS 36.213 [3].

- The requirements for CEMode B shall apply provided the UE category M2 is configured with CEMode B, SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB. The CEMode B and the number of repetition levels for different physical channels are defined in TS 36.213 [3].

- The requirements for CEMode B shall apply provided the UE category M2 is configured with CEMode A and capable of ce-ModeB [2], -15 dB ≤ SCH Ês/Iot ≤ -6 dB and -15 dB ≤ CRS Ês/Iot ≤ -6 dB.

- Unless explicitly defined the following additional requirements are applicable to UE category M2:

- Cell Selection and Re-selection Requirements in section 4.7

- Handover requirements in section 5.5 and 5.6

- Random access requirements in section 6.2.3

- RRC re-establishment requirements in section 6.7

- RRC connection release with redirection requirements in section 6.8

- Radio Link monitoring requreiements in section 7.19

- Timing advance requirements in section 7.28

- UE timer accuracy requirement in section 7.27

- E-UTRAN intra frequency measurement requirements in section 8.13.2.1 and 8.13.3.1

- E-UTRAN inter frequency measurement requirements in section 8.13.2.6 and 8.13.3.5

- UE measurement capability in section 8.13.2.7 and 8.13.3.6

- E-UTRAN E-CID measurements requirements in section 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

- Measurement accuracy requirements in section 9.1.21.1 to 9.1.21.16.

- The requirements for non-BL CE UE are derived assuming: DL and UL category other than Category 0/M1/M2/NB1/NB2, operation in any LTE system bandwidth but with a channel bandwidth not exceeding 20MHz, transmission bandwidth not exceeding 96RB in downlink and 5MHz in uplink, and dual antenna receiver, when in RRC\_IDLE mode camped on a cell acquired using SIB1-BR, or in RRC\_CONNECTED configured with CE mode A/B. Non-BL CE UE is defined in [31].

- The Cat-M2 UE requirements for normal coverage in idle mode shall apply provided the UE is non-BL CE and with the radio condition that the serving cell SCH Ês/Iot ≥ -6dB and CRS Ês/Iot ≥ -6 dB, unless corresponding individual non-BL CE requirements are specified.

- The Cat-M2 UE requirements for enhanced coverage in idle mode shall apply provided the UE is non-BL CE capable of ce-ModeB [2] and with the radio condition that the serving cell -6dB ≥ SCH Ês/Iot ≥ -15dB and -6dB ≥ CRS Ês/Iot ≥ -15 dB, unless corresponding individual non-BL CE requirements are specified.

- The Cat-M2 UE requirements for CEMode A shall apply provided the UE is non-BL CE and is configured with CEModeA, the serving cell SCH Ês/Iot ≥ -6 dB and CRS Ês/Iot ≥ -6 dB, unless corresponding individual non-BL CE requirements are specified. The CEMode A and the number of repetition levels for different physical channels are defined in [3].

- The Cat-M2 UE requirements for CEMode B shall apply provided the UE is non-BL CE and is configured with CEMode B, the serving cell SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB, unless corresponding individual non-BL CE requirements are specified. The CEMode B and the number of repetition levels for different physical channels are defined in [3].

- Unless explicitly defined the following additional requirements are applicable to non-BL CE UE:

- Cell Selection and Re-selection Requirements in section 4.7

- Handover requirements in section 5.5 and 5.6

- Random access requirements in section 6.2.3

- RRC re-establishment requirements in section 6.7

- RRC connection release with redirection requirements in section 6.8

- UE transmit timing requirements in section 7.26

- Radio Link monitoring requreiements in section 7.19

- Timing advance requirements in section 7.28

- UE timer accuracy requirement in section 7.27

- E-UTRAN intra frequency measurement requirements in section 8.13.2.1 and 8.13.3.1.1, 8.13.3.1.2, and 8.13.3.1.3

- E-UTRAN inter frequency measurement requirements in section 8.13.2.6 and 8.13.3.5

- UE measurement capability in section 8.13.2.7 and 8.13.3.6

- E-UTRAN E-CID measurements requirements in section 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, 8.16.2.1, 8.16.2.2, 8.16.2.2a and 8.13.3.4

- E-UTRAN OTDOA RSTD measurements requirements in section 8.16.2.3, 8.16.2.4, 8.16.3.1 and 8.16.3.2 except those requiring any of the measurement gap pattern in Table 8.1.2.1-3.

- Measurement accuracy requirements in section 9.1.25

- Measurement accuracy requirements in section 9.1.21 if the UE is of category 1bis.

- Requirements for E-UTRA ProSe Direct Discovery and E-UTRA ProSe Direct Communication are applicable for ProSe operation on either the uplink frequency of PCC, or SCC, or a non-serving carrier, but:

- with ProSe operation limited to one carrier on a given subframe.

- Requirements for interruptions due to ProSe Direct Discovery and/or ProSe Direct Communications specified in clause 7.16.3 apply, but:

- with configured serving carriers of up to two downlink CCs, unless the UE is configured with reception gap for ProSe operation, and

- with configured serving carriers of up to two uplink CCs, unless the UE is configured with transmission gap for ProSe operation.

- The requirements for UE category NB1 are derived assuming UE category NB1and a single antenna receiver. UE category NB1 is defined in TS 36.306 [31].

- The requirements for normal coverage shall apply for UE category NB1 provided that the radio condition of its serving cell are: NSCH Ês/Iot ≥ -6 dB and NRS Ês/Iot ≥ -6 dB.

- The requirements for enhanced coverage shall apply for UE category NB1 provided that the radio condition of its serving cell are: -15 dB ≤ NSCH Ês/Iot < -6 dB and -15 dB ≤ NRS Ês/Iot < -6 dB.

- The measurement accuracy requirements in section 9.1.22 for intra-frequency and inter-frequency absolute NRSRQ accuracy for UE Category NB1 apply only in idle mode.

- The measurement accuracy requirements in section 9.1.22 for intra-frequency absolute NRSRP accuracy for UE Category NB1 apply in idle and connected mode.

- The measurement accuracy requirements in section 9.1.22 for inter-frequency absolute NRSRP accuracy for UE Category NB1 apply only in idle mode.

- The requirements for SRS carrier based switching shall apply when the UE capable of SRS carrier based switching is configured to perform SRS carrier based switching for transmitting SRS and/or RACH in one or more CCs in the same or different time resources.

**-** The requirements for a UE category 1bis are derived assuming UE category 1bis [31] and a single antenna receiver. Following requirements are applicable to UE category 1bis.

- Cell re-selection requirements in section 4.2.2.1 to 4.2.2.10

- Handover requirements in section 5.1, 5.2, 5.3 and 5.4

- RRC re-establishment requirements in section 6.1

- Random access requirements in section 6.2

- RRC connection release with redirection requirements in section 6.3

- UE transmit timing requirements in section 7.1

- UE timer accuracy requirements in section 7.2

- Timing advance requirements in section 7.3

- Radio link monitoring requirements in section 7.11

- UE measurement capability in section 8.1.2.1

- E-UTRAN intra frequency measurement requirements in section 8.5.2.1.1 and 8.5.2.1.3

- E-UTRAN inter frequency measurement requirements in section 8.1.2.3.1, 8.1.2.3.2, 8.1.2.3.3 and 8.1.2.3.4

- Inter RAT measurement requirements in section 8.1.2.4

- OTDOA Intra-Frequency measurement requirements in section 8.1.2.5.3, 8.1.2.5.4

- OTDOA Inter-Frequency measurement requirements in section 8.1.2.6.5, 8.1.2.6.6, 8.1.2.6.7 and 8.1.2.6.8

- E-UTRAN E-CID measurement requirements in section 8.1.2.7

- CGI reading requirements for UE category 0 in section 8.5.2.1.4 and 8.5.2.1.6

- Intra-frequency RSRP Accuracy Requirements in section 9.1.2.7 and 9.1.2.8

- Inter-frequency RSRP Accuracy Requirements in section 9.1.3.3 and 9.1.3.4

- Intra-frequency RSRQ Accuracy Requirements in section 9.1.5.5

- Inter-frequency RSRQ Accuracy Requirements in section 9.1.6.5 and 9.1.6.6

- RSTD Intra-Frequency Accuracy Requirement in section 9.1.10.5

- RSTD Inter-Frequency Accuracy Requirement in section 9.1.10.6

- UE Rx – Tx time difference measurement accuracy requirements in section 9.1.9.1 and 9.1.9.2

- The requirements for UE category NB2 are derived assuming UE category NB2 and a single antenna receiver. UE category NB2 is defined in TS 36.306 [31]. Following requirements are applicable to UE category NB2.

- Cell selection and re-selection requirements in section 4.6.1 and 4.6.2

- UE Positioning measurement in idle state in section 4.8

- RRC Re-establishment requirements in section 6.5

- Random access requirements in section 6.6

- RRC connection redirection to non-anchor carrier requirements in section 6.9

- UE transmit timing requirements in section 7.20

- UE timer accuracy requirements in section 7.21

- Timing advance requirements in section 7.22

- Radio link monitoring requirements in section 7.23

- UE RRC\_CONNECTED state measurement requirement in section 8.14

- UE measurement accuracy requirements in section 9.1.22

- Power headroom requirements in section 9.1.23

- All requirements in this specification for UE receiving PMCH in FeMBMS/Unicast-mixed cells apply only for FeMBMS/Unicast-mixed cells configured based on frame structure 1.

- Requirements for E-UTRA carrier aggregation with one or more FeMBMS/Unicast-mixed SCells shall apply, provided the total number of SCCs, including SCCs with FeMBMS/Unicast-mixed SCells, does not exceed the the maximum number of SCCs the UE is capable of.

- Unless explictly stated, requirements related to NR do not apply when CCA is used on serving or neighbour cells.