**3GPP TSG-RAN WG2 Meeting #109-e *Draft R2-200xxxx***

**Electronic meeting, 24 - Feb - 6 Mar**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **36.306** | **CR** | **xxxx** | **rev** | **-** | **Current version:** | **15.7.0** |  |
|  |
| *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:***  | Introduction of UE capabilities for eDCCA |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | LTE\_NR\_DC\_CA\_enh-Core |  | ***Date:*** | 24/02/2020 |
|  |  |  |  |  |
| ***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)* |
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| ***Reason for change:*** | Introduction of UE capabilities for eDCCA |
|  |  |
| ***Summary of change:*** | Addition of the following capabilitiesMeasurement parameters:- ca-IdleInactiveMeasurements-r16- endc-IdleInactiveMeasurements-r16- idleInactiveValidityAreaList-r16Other parameters:- resumeWithSCells-r16- resumeWithSCG-r16- mcgRLF-RecoveryViaSCG-r16MAC parameters:- directSCellActivationResume-r16 |
|  |  |
| ***Consequences if not approved:*** | UE capabilities for eDCCA are missing |
|  |  |
| ***Clauses affected:*** | 4.3.6, 4.3.15, 4.3.19 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.331 CR xx  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

### 4.3.6 Measurement parameters

#### 4.3.6.1 *interFreqNeedForGaps* and *interRAT-NeedForGaps*

These fields define for each supported E-UTRA band whether measurement gaps are required to perform inter-frequency measurements on each supported E-UTRA radio frequency band and inter-RAT measurements on each supported RAT/band combination. A UE also indicates for each band combination as in the supportedBandCombination whether measurement gaps are required to perform inter-frequency measurements on each supported E-UTRA radio frequency band and inter-RAT measurements on each supported RAT/band combination.

#### 4.3.6.2 *rsrqMeasWideband*

This field defines whether the UE can perform RSRQ measurements in RRC\_IDLE and RRC\_CONNECTED with wider bandwidth as specified in TS 36.133 [16].

#### 4.3.6.3 *timerT312-r12*

This field defines whether the UE supports T312 as specified in TS 36.331 [5].

#### 4.3.6.4 *alternativeTimeToTrigger-r12*

This field defines whether the UE supports alternativeTimeToTrigger as specified in TS 36.331 [5].

#### 4.3.6.5 *benefitsFromInterruption-r11*

This field indicates whether the UE power consumption could benefit from being allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for *measCycleSCell* of less than 640ms, as specified in TS 36.133 [16].

#### 4.3.6.6 *incMonEUTRA-r12*

This field defines whether the UE supports increased number of E-UTRA carrier monitoring in RRC\_IDLE and RRC\_CONNECTED as specified in TS 36.133 [16], and whether the UE supports extended number of cell re-selection priorities for EUTRA frequencies in *RRCConnectionRelease*, as specified in TS 36.331 [5]. It is mandatory for UEs of this release of the specification, except for Category 0 and 1bis UEs.

A UE that supports increased number of E-UTRA carrier monitoring shall also support extended number of measurement identities.

#### 4.3.6.7 *incMonUTRA-r12*

This field defines whether the UE supports increased number of UTRA carrier monitoring in RRC\_IDLE and RRC\_CONNECTED as specified in TS 36.133 [16].

A UE that supports increased number of UTRA carrier monitoring shall also support extended number of measurement identities.

#### 4.3.6.8 *extendedMaxMeasId-r12*

This field defines whether the UE supports extended number of measurement identities as defined by *maxMeasId-r12* in TS 36.331 [5].

It is mandatory for UEs of this release of the specification if *incMonEUTRA-r12* or *incMonUTRA-r12* or *dc-Support-r12* or *extendedMaxObjectId-r13* is supported.

#### 4.3.6.9 *crs-DiscoverySignalsMeas-r12*

This field defines whether the UE supports CRS based discovery signals measurement as specified in TS 36.331 [5], and PDSCH/EPDCCH RE mapping with zero power CSI-RS configured for discovery signals.

#### 4.3.6.10 *csi-RS-DiscoverySignalsMeas-r12*

This field defines whether the UE supports CSI-RS based discovery signals measurement as specified in TS 36.331 [5]. A UE that supports this feature shall also support *crs-DiscoverySignalsMeas-r12*.

#### 4.3.6.11 *extendedRSRQ-LowerRange-r12*

This field defines whether the UE supports the extended RSRQ lower value range from -34dB to -19.5dB in measurement configuration and reporting as specified in TS 36.133 [16].

#### 4.3.6.12 *rsrq-OnAllSymbols-r12*

This field defines whether the UE supports the RSRQ measurement on all OFDM symbols as specified in TS 36.214 [23] and also the extended RSRQ upper value range from -3dB to 2.5dB in measurement configuration and reporting as specified in TS 36.133 [16]. If the UE supports *rsrq-OnAllSymbols-r12* and *rsrqMeasWideband* it shall also support the RSRQ measurement on all OFDM symbols with wider bandwidth.

#### 4.3.6.13 *rs-SINR-Meas-r13*

This field defines whether the UE can perform RS-SINR measurements in RRC\_CONNECTED as specified in TS 36.214 [23].

#### 4.3.6.14 *whiteCellList-r13*

This field defines whether the UE supports configuration and use of white-listed cells as specified in TS 36.331 [5].

#### 4.3.6.15 *extendedFreqPriorities-r13*

This field defines whether the UE supports extended E-UTRA frequency priorities as specified in TS 36.331 [5] and indicated by *cellReselectionSubPriority* field.

A UE supporting NR SA operation shall support extended E-UTRA frequency priorities and NR frequency priorities as specified in TS 36.331 [9] and indicated by *CellReselectionSubPriority* field.

#### 4.3.6.16 *extendedMaxObjectId-r13*

This field defines whether the UE supports extended number of measurement object identities as defined by *maxObjectId-r13* in TS 36.331 [5]. The field is mandatory present for the UE supporting the configuration of *sCellToAddModListExt*. A UE indicating support of *extendedMaxObjectId-r13* shall also indicate the support of *extendedMaxMeasId-r12*.

#### 4.3.6.17 *ul-PDCP-Delay-r13*

This field defines whether the UE supports UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [25]. A UE that supports the UL PDCP Delay measurement shall also support the measurement configuration and reporting as specified in TS 36.331 [5].

#### 4.3.6.18 Void

#### 4.3.6.19 *rssi-AndChannelOccupancyReporting-r13*

This field defines whether the UE supports measurement and reporting for RSSI and channel occupancy. This field is only applicable if the UE supports downlink LAA operation.

#### 4.3.6.20 *multiBandInfoReport-r13*

This field defines whether the UE supports the acquisition and reporting of multi band information for *reportCGI* as specified in TS 36.331 [5].

#### 4.3.6.21 Void

#### 4.3.6.22 Void

#### 4.3.6.23 *ceMeasurements-r14*

This field defines whether the UE supports intra-frequency RSRQ measurements and inter-frequency RSRP and RSRQ measurements in RRC\_CONNECTED, as specified in TS 36.133 [16], TS 36.304 [14] and TS 36.331 [5]. In this release of specification, it is mandatory for UEs of Category M1 and M2 and UEs that support coverage enhancements to support *ceMeasurements-r14*. A UE indicating support of *ceMeasurements-r14* shall also indicate support of *ce-ModeA-r13*.

#### 4.3.6.24 *ncsg-r14*

This field defines whether the UE supports NCSG gap as specified in TS 36.133 [16]. If the UE supports *ncsg-r14* and asynchronous DC, the UE shall support NCSG Pattern Id 0, 1, 2 and 3. If the UE supports ncsg-r14 but the UE does not support asynchronous DC, only NCSG Pattern Id 0 and 1 shall be supported.

#### 4.3.6.25 *perServingCellMeasurementGap-r14*

This field defines whether the UE supports per CC measurement gap as specified in TS 36.331 [5].

#### 4.3.6.26 *shortMeasurementGap-r14*

This field defines whether the UE supports shorter measurement gap length (i.e. *gp2* and *gp3*) in LTE standalone as specified in TS 36.133 [16], and for independent measurement gap configuration on FR1 and per-UE gap in (NG)EN-DC as specified in TS38.133 [37].

#### 4.3.6.27 *nonUniformGap-r14*

This field defines whether the UE supports measurement non uniform Pattern Id 1, 2, 3 and 4 in LTE standalone as specified in TS 36.133 [16].

#### 4.3.6.28 *rlm-ReportSupport-r14*

This field defines whether the UE supports RLM event and information reporting as specified in TS 36.133 [16].

#### 4.3.6.29 Void

#### 4.3.6.30 *qoe-MeasReport-r15*

This field defines whether the UE supports QoE Measurement Collection for streaming services.

#### 4.3.6.31 *ca-IdleModeMeasurements-r15*

This field defines whether the UE supports performing eNB-configured CRS-based RRM measurements for configured carrier(s) in RRC\_IDLE mode, including reporting them when requested by eNB while in RRC\_CONNECTED, as specified in TS 36.331 [5].

#### 4.3.6.32 *ca-IdleModeValidityArea-r15*

This field defines whether the UE supports configuration of *validityArea* for performing eNB-configured CRS-based RRM measurements for configured carrier(s) in RRC\_IDLE mode, as specified in TS 36.331 [5]. A UE that supports this feature shall also support *ca-IdleModeMeasurements-r15*.

#### 4.3.6.33 *qoe-MTSI-MeasReport-r15*

This field defines whether the UE supports QoE Measurement Collection for MTSI services.

#### 4.3.6.34 *multipleCellsMeasExtension-r15*

This field defines whether the UE supports measurement reporting triggered based on a number of cells.It is mandatory to support this feature for UEs which have Aerial UE subscription as defined in TS 23.401 [18].

#### 4.3.6.35 *heightMeas-r15*

This field defines whether the UE supports height-based measurement reporting as specified in TS 36.331 [5]. It is mandatory to support this feature for UEs which have Aerial UE subscription as defined in TS 23.401 [18].

#### 4.3.6.36 *measGapPatterns-r15*

This field defines whether the UE that supports NR supports gap patterns 4 to 11 in LTE standalone as specified in TS 36.133 [16], and for independent measurement gap configuration on FR1 and per-UE gap in (NG)EN-DC as specified in TS38.133 [37].

#### 4.3.6.x1 *ca-IdleInactiveMeasurements-r16*

This field defines whether the UE supports:

- (if the UE supports *inactiveState-r15*), performing eNB-configured CRS-based RRM measurements for configured carrier(s) in RRC\_INACTIVE, including reporting them when requested by the eNB while resuming from RRC\_INACTIVE or in RRC\_CONNECTED, as specified in TS 36.331 [5];

- (if the UE supports RRC connection suspension), reporting eNB-configured CRS-based RRM measurements for configured carrier(s) in RRC\_IDLE while resuming the RRC connection from RRC\_IDLE, as specified in TS 36.331 [5];

A UE that supports this feature shall also support *ca-IdleInactiveMeasurements-r15*.

#### 4.3.6.x2 *endc-IdleInactiveMeasurements-r16*

This field defines whether the UE supports performing eNB-configured NR SSB-based RRM measurements for configured carrier(s) in RRC\_IDLE and in RRC\_INACTIVE (if the UE supports *inactiveState-r15*), including reporting them when requested by the eNB while resuming from RRC\_IDLE/RRC\_INACTIVE or in RRC\_CONNECTED, as specified in TS 36.331 [5].

FFS1: Is the UE that supports this feature required to also support *ca-IdleInactiveMeasurements-r16*?

FFS2: Separate capability for RRC\_IDLE and RRC\_INACTIVE.

#### 4.3.6.x3 *idleInactiveValidityAreaList-r16*

This field defines whether the UE supports configuration of *validityAreaList-r16* for performing eNB-configured measurements for configured carrier(s) in RRC\_IDLE and in RRC\_INACTIVE, as specified in TS 36.331 [5].

A UE that supports this feature shall also support *ca-IdleInactiveMeasurements-r16* and/or *endc-IdleInactiveMeasurements-r16*.

FFS: A UE that supports this feature shall also support *ca-IdleModeValidityArea-r15*.

### 4.3.15 Other parameters

#### 4.3.15.1 Void

#### 4.3.15.2 *inDeviceCoexInd-r11*

This parameter defines whether the UE supports in-device coexistence indication as well as autonomous denial functionality as specified in TS 36.331 [5].

#### 4.3.15.3 *powerPrefInd-r11*

This parameter defines whether the UE supports power preference indication as specified in TS 36.331 [5].

#### 4.3.15.4 *ue-Rx-TxTimeDiffMeasurements-r11*

This parameter defines whether the UE supports Rx - Tx time difference measurements as specified in TS 36.331 [5] and TS 36.355 [13]. A TDD UE of this release of the specification that supports UE Rx-Tx time difference measurements, shall support to report UE Rx-Tx time difference measurement result including NTAoffset according to EUTRAN TDD Rx-Tx time difference measurement report mapping as specified in TS 36.133 [16].

#### 4.3.15.5 Void

#### 4.3.15.6 Void

#### 4.3.15.7 Void

#### 4.3.15.8 *inDeviceCoexInd-UL-CA-r11*

This parameter defines whether the UE supports UL CA related in-device coexistence indication as specified in TS 36.331 [5]. A UE that supports UL CA related in-device coexistence indication shall also support in-device coexistence indication.

#### 4.3.15.9 *bwPrefInd-r14*

This parameter defines whether the UE supports maximum PDSCH/PUSCH bandwidth preference indication as specified in TS 36.331 [5]. A UE indicating support of *bwPrefInd-r14* shall also indicate support of *ce-ModeA-r13*.

#### 4.3.15.10 *inDeviceCoexInd-HardwareSharingInd-r13*

This parameter defines whether the UE supports hardware sharing indication as specified in TS 36.331 [5]. A UE that supports hardware sharing indication shall also indicate support of LAA operation.

#### 4.3.15.11 *overheatingInd-r14*

This parameter defines whether the UE supports overheating assistance information as specified in TS 36.331 [5].

#### 4.3.15.12 *assistInfoBitForLC-r15*

This parameter defines whether the UE supports assistance information bit for local cache as specified in TS 36.323 [2].

#### 4.3.15.13 *timeReferenceProvision-r15*

This parameter defines whether the UE supports provision of time reference message *TimeReferenceInformation* as specified in TS 36.331 [5].

#### 4.3.15.14 *flightPathPlan-r15*

This field defines whether the UE supports reporting of the flight path plan through the procedure defined in TS 36.331 [5].

#### 4.3.15.15 *inDeviceCoexInd-ENDC-r15*

This parameter defines whether the UE supports in-device coexistence indication for EN-DC operation as specified in TS 36.331 [5]. A UE that supports in-device coexistence indication for EN-DC operation shall also support in-device coexistence indication.

#### 4.3.15.16 *nonCSG-SI-Reporting-r14*

This parameter defines whether the UE supports reporting of PLMN list from cells not broadcasting the field *csg-Identity*.

#### 4.3.15.x1 *resumeWithSCells -r16*

This parameter defines whether the UE supports not deleting the stored MCG SCell configuration when initiating the resume procedure and (re-)configuration of MCG SCells in the *RRCConnectionResume* message as specified in TS 36.331 [5].

FFS 1: Split in "not deleting the stored SCell configuration" and "(re-)configuration of an SCG during the resume procedure".

FFS 2: Split in "resume from RRC\_IDLE" and "resume from RRC\_INACTIVE".

#### 4.3.15.x2 *resumeWithSCG -r16*

This parameter defines whether the UE supports not deleting the stored SCG configuration when initiating the resume procedure and (re-)configuration of SCG in the *RRCConnectionResume* message as specified in TS 36.331 [5].

FFS 1: Split in "not deleting the stored SCG configuration" and "configuration of an SCG during the resume procedure" (it is assumed that if both are supported, the network can reconfigure the stored SCells).

FFS 2: Split "resume from RRC\_IDLE" and "resume from RRC\_INACTIVE".

#### 4.3.15.x3 *mcgRLF-RecoveryViaSCG-r16*

This parameter defines whether the UE supports recovery from MCG RLF via split SRB1 (if supported) and via SRB3 (if supported) as specified in TS 36.331 [5].

TBC: No need to separate split SRB1 from SRB3, or NR-DC and NE-DC.

### 4.3.19 MAC parameters

#### 4.3.19.1 *longDRX-Command-r12*

This field defines whether the UE supports Long DRX Command MAC Control Element as specified in TS 36.321 [4]. It is mandatory for UEs of this release of the specification.

#### 4.3.19.2 *logicalChannelSR-ProhibitTimer-r12*

This field defines whether the UE supports the *logicalChannelSR-ProhibitTimer* as specified in TS 36.321 [4]. It is mandatory for UEs of any *ue-Category-NB* to support this feature.

#### 4.3.19.3 *extendedMAC-LengthField-r13*

This field defines whether the UE supports 16 bit length of MAC L field as specified in TS 36.321 [4].

#### 4.3.19.4 *extendedLongDRX-r13*

This field defines whether the UE supports the *longDRX-Cycle* values of 5120 and 10240 subframes as specified in TS 36.321 [4].

#### 4.3.19.5 *shortSPS-IntervalFDD-r14*

This field indicates whether the UE supports uplink SPS intervals shorter than 10 subframes in FDD mode. A UE that supports *shortSPS-IntervalFDD-r14* shall also support *skipUplinkSPS-r14*.

#### 4.3.19.6 *shortSPS-IntervalTDD-r14*

This field indicates whether the UE supports uplink SPS intervals shorter than 10 subframes in TDD mode. A UE that supports *shortSPS-IntervalTDD-r14* shall also support *skipUplinkSPS-r14*.

#### 4.3.19.7 *skipUplinkDynamic-r14*

This field indicates whether the UE supports skipping of UL transmission for an uplink grant indicated on PDCCH if no data is available for transmission as specified in TS 36.321 [4].

#### 4.3.19.8 *skipUplinkSPS-r14*

This field indicates whether the UE supports skipping of UL transmission for a configured uplink grant if no data is available for transmission as specified in TS 36.321 [4].

#### 4.3.19.9 *dataInactMon-r14*

This field defines whether the UE supports data inactivity monitoring as specified in TS 36.321 [4].

#### 4.3.19.10 *rai-Support-r14*

This field defines whether the UE supports Release Assistance Indication (RAI) as specified in TS 36.321 [4]. This field is only applicable if the UE supports UE category M1 or UE category M2 or any *ue-Category-NB*.

#### 4.3.19.11 *multipleUplinkSPS-r14*

This field defines whether the UE supports multiple uplink SPS and reporting SPS assistance information. A UE indicating *multipleUplinkSPS* shall also support V2X communication via Uu, as defined in TS 36.300 [30].

#### 4.3.19.12 *min-Proc-TimelineSubslot-r15*

This field defines the UE minimum processing timeline supported for subslot operation for the different SPDCCH configurations. The minimum processing timeline is indicated by one of two sets in *ProcessingTimelineSet-r15*. Each set consists of two different processing timeline options and associated maximum TA. The minimum processing timeline to use out of the two options for a given set is configured by *min-proc-TimeTA-SubslotSet1-r15* and *min-procTimeTA-SubslotSet2-r15,* seeTS 36.331 [5]. Support of Set 1 implicitly means support of Set 2.

The sets supported can be different for 1os CRS-based SPDCCH, 2os CRS-based SPDCCH and DMRS-based SPDCCH. The field consists of a sequence of *ProcessingTimelineSet-r15*. The sequence applies to (in order):

1. 1os CRS based SPDCCH

2. 2os CRS based SPDCCH

3. DMRS based SPDCCH

#### 4.3.19.13 *skipSubframeProcessing-r15*

This fields defines whether the UE supports, within a serving cell, aborting reception of PDSCH if the UE receives slot-PDSCH/subslot-PDSCH during an ongoing PDSCH reception and instead starts receiving the slot-PDSCH/subslot-PDSCH, as well as whether the UE supports aborting a PUSCH transmission if the UE gets a grant for a slot-PUSCH/ subslot-PUSCH transmission that overlaps with a grant received for a PUSCH transmission. The capability indicates the number of subframes that the UE may drop prior to the subframe in which it prioritizes the processing of slot/subslot PDSCH/PUSCH. Separate capability for UL and DL and per sTTI length in each direction.

#### 4.3.19.14 *earlyContentionResolution-r14*

This field defines whether the UE supports MAC PDU that contains only the UE Contention Resolution Identity MAC control element but no RRC response message, as specified in TS 36.331 [5]. It is mandatory for UEs that support any *ue-Category-NB* of this release of the specification.

#### 4.3.19.15 *sr-SPS-BSR-r15*

This field defines whether the UE supports SR with SPS BSR, as defined in TS 36.321 [4]. This feature is only applicable if the UE supports any *ue-Category-NB*.

#### 4.3.19.16 *dormantSCellState-r15*

This field defines whether the UE supports the dormant SCell state, as specified in TS 36.321 [4] and TS 36.331 [5].

#### 4.3.19.17 *directSCellActivation-r15*

This field defines whether the UE supports having an SCell configured in activated SCell state, as defined in TS 36.321 [4] and TS 36.331 [5].

#### 4.3.19.18 *directSCellHibernation-r15*

This field defines whether the UE supports having an SCell configured in dormant SCell state, as defined in TS 36.321 [4] and TS 36.331 [5]. A UE that indicates support for this shall also indicate support for *dormantSCellState-r15*.

#### 4.3.19.19 *sps-ServingCell-r15*

This field indicates whether the UE supports multiple UL/DL SPS configurations simultaneously active on different serving cells as specified in TS 36.321 [4].

#### 4.3.19.20 *extendedLCID-Duplication-r15*

This field indicates whether the UE supports use of extended LCIDs 32-38 for PDCP duplication. A UE that supports *extendedLCID-Duplication-r15* shall also support the extended LCID as specified in TS 36.321 [4].

#### 4.3.19.21 *eLCID-Support-r15*

This field indicates whether the UE supports LCID "10000" and MAC PDU subheader containing the eLCID field as specified in TS 36.321 [4].

#### 4.3.19.x *directSCellActivationResume-r16*

This field defines whether the UE supports having an SCell configured in activated SCell state in the *RRCConnectionResume* message, as defined in TS 36.321 [4] and TS 36.331 [5].