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

**Online, 24 February – 06 March, 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.306** | **CR** | **1729** | **rev** | **1** | **Current version:** | **15.7.0** |  |
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| *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 LTE-based 5G terrestrial broadcast | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_terr\_bcast-Core | | | | |  | ***Date:*** | | | 2020-02-13 |
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| ***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 can be 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:*** | | The list of UE capabilities for the support of LTE-based 5G terrestrial broadcast provided in R2-1914321 needs to be captured. | | | | | | | | |
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| ***Summary of change:*** | | Following changes are made:   1. CAS and CFI are added in the list of abbreviations in section 3.3. 2. As per R2-1914321, new UE capabilities, *mbms-ScalingFactor2dot5-r16*, *mbms-ScalingFactor0dot37-r16*, *timeSeparation-Slot2-r16* and *timeSeparation-Slot4-r16*, to support the 5G terrestrial broadcast are captured. 3. Support of PBCH repetition in CAS, PDCCH AL16 for CAS in MBMS-dedicated cell and semi-static CFI indication in MIB are added as optional feature without UE radio access capability parameters in section 6.3. | | | | | | | | |
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| ***Consequences if not approved:*** | | UE cannot receive the MBMS services transmitted with 2.5kHz and 0.37KHz numerology. UE cannot support enhancements to the physical channels and signals in CAS. | | | | | | | | |
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| ***Clauses affected:*** | | 3.3, 4.3.17, 6.3.x (new), 6.3.y (new). 6.3.z (new) | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS/TR 36.331 CR 4190  TS/TR 36.443 CR 0127  TS/TR 36.211 CR 0504  TS/TR 36.213 CR 1294 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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| First change |

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

1xRTT CDMA2000 1x Radio Transmission Technology

ACK Acknowledgement

ACDC Application specific Congestion control for Data Communication

ANDSF Access Network Discovery and Selection Function

BCCH Broadcast Control Channel

CAS Cell Acquisition Subframes

CFI Control Format Indicator

CG Cell Group

CRS Cell-specific Rerefence Signal

CSG Closed Subscriber Group

CSI Channel State Information

DC Dual Connectivity

DCI Downlink Control Information

DL-SCH Downlink Shared Channel

E-UTRA Evolved Universal Terrestrial Radio Access

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDD Frequency Division Duplex

GERAN GSM/EDGE Radio Access Network

HARQ Hybrid Automatic Repeat Request

HRPD High Rate Packet Data

IRC Interference Rejection Combining

MAC Medium Access Control

MMSE Minimum Mean Squared Error

MRO Mobility Robustness Optimisation

MTSI Multimedia Telephony Service for IMS

MUST MultiUser Superposition Transmission

NAICS Network Assisted Interference Cancellation/Suppression

NB-IoT Narrow Band Internet of Things

OS OFDM Symbol

PCell Primary Cell

PDCCH Physical Downlink Control Channel

PDCP Packet Data Convergence Protocol

PDSCH Physical Downlink Shared Channel

PHR Power Headroom Reporting

ProSe Proximity-based Services

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

QoE Quality of Experience

RACH Random Access CHannel

RAI Release Assistance Indication

RAT Radio Access Technology

RLC Radio Link Control

ROHC RObust Header Compression

RRC Radio Resource Control

SC-PTM Single Cell Point to Multipoint

SCC Secondary Component Carrier

SCell Secondary Cell

SI System Information

SL Sidelink

SL-DCH Sidelink Discovery CHannel

SL-SCH Sidelink Shared CHannel

SON Self Organizing Networks

SPT Short Processing Time

SR Scheduling Request

SSAC Service Specific Access Control

SSTD SFN and Subframe Timing Difference

STTI Short TTI

TDD Time Division Duplex

TTI Transmission Time Interval

UCI Uplink Control Information

UDC Uplink Data Compression

UE User Equipment

UL-SCH Uplink Shared Channel

UMTS Universal Mobile Telecommunications System

UTRA UMTS Terrestrial Radio Access

V2X Vehicle-to-Everything

WLAN Wireless Local Area Network

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| Next change |

4.3.17 MBMS parameters

4.3.17.1 *mbms-SCell-r11*

This parameter defines whether the UE in RRC\_CONNECTED supports MBMS reception via MBSFN on a frequency indicated in an *MBMSInterestIndication* message, when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated), as specified in TS 36.331 [5].

4.3.17.2 *mbms-NonServingCell-r11*

This parameter defines whether the UE in RRC\_CONNECTED supports MBMS reception via MBSFN on a frequency indicated in an *MBMSInterestIndication* message, where (according to *supportedBandCombination* and to network synchronization properties) a serving cell may be additionally configured, as specified in TS 36.331 [5]. If this is supported, the UE shall also support MBMS reception via MBSFN on a frequency when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated), as specified in TS 36.331 [5].

4.3.17.3 *mbms-AsyncDC-r12*

This parameter defines whether the UE in RRC\_CONNECTED supports MBMS reception via MBSFN on a frequency indicated in an *MBMSInterestIndication* message, where according to *supportedBandCombination*, the carriers are configured or can be configured as serving cells in the MCG and the SCG which are not synchronized, specified in TS 36.331 [5]. In this release of specification, it is mandatory to support this according to *MBMSInterestIndication* and indicated *supportedBandCombination*.

4.3.17.4 *fembmsMixedCell-r14*

This parameter defines whether the UE in RRC\_CONNECTED supports MBMS reception with 15kHz subcarrier spacings via MBSFN from FeMBMS/Unicast mixed cells on a frequency indicated in an *MBMSInterestIndication* message.

4.3.17.5 *fembmsDedicatedCell-r14*

This parameter defines whether the UE in RRC\_CONNECTED supports MBMS reception with 15kHz subcarrier spacings via MBSFN from MBMS-dedicated cells on a frequency indicated in an *MBMSInterestIndication* message.

4.3.17.6 *subcarrierSpacingMBMS-khz1dot25-r14, subcarrierSpacingMBMS-khz7dot5-r14*

This parameter defines the supported subcarrier spacing for MBSFN subframes on FeMBMS/Unicast mixed cells or MBMS-Dedicated cells in addition to 15kHz subcarrier spacing. The *subcarrierSpacingMBMS-khz7dot5-r14* refers to 7.5kHz subcarrier spacing and *subcarrierSpacingMBMS-khz1dot25-r14* refers to 1.25 kHz subcarrier spacing as defined in TS 36.211 [21], clause 6.12. This field is included only if UE supports MBMS reception from FeMBMS/Unicast mixed cell or MBMS-dedicated cell.

4.3.17.7 *mbms-MaxBW-r14*

This parameter defines the maximum supported bandwidth (T) for MBMS reception, see TS 36.213 [22], clause 11.1. If the value is set to *implicitValue*, the corresponding value of T is calculated as specified in TS 36.213 [22], clause 11.1. If the value is set to *explicitValue*, the actual value of T = *explicitValue* \* 40 MHz.

4.3.17.8 *mbms-ScalingFactor1dot25-r14*, *mbms-ScalingFactor7dot5-r14*

These parameters correspond to A(1.25 and A(7.5, respectively, i.e., scaling factor for processing one unit of bandwidth corresponding to subcarrier spacing of 1.25 kHz and 7.5 kHz, with respect to one unit of bandwidth corresponding to subcarrier spacing of 15 kHz. See TS 36.213 [22], clause 11.1. The field is included only if UE supports corresponding subcarrier spacing for MBSFN subframes on FeMBMS/Unicast mixed cells or MBMS-Dedicated cells in addition to 15kHz subcarrier spacing. The field shall be included if the UE supports corresponding subcarrier spacing for MBSFN subframes on FeMBMS/Unicast mixed cells or MBMS-Dedicated cells in addition to 15kHz subcarrier spacing and *mbms-MaxBW-r14* is included.

4.3.17.x *mbms-ScalingFactor0dot37-r16*, *mbms-ScalingFactor2dot5-r16*

These parameters indicate whether UE supports subcarrier spacing of 0.37 kHz / 2.5 KHz, for MBSFN subframes as described in TS 36.211 [17], clause 6.12. The indicated value corresponds to A(0.37 / A(2..5, i.e., scaling factor for processing one unit of bandwidth corresponding to subcarrier spacing of 0.37 kHz / 2.5 kHz, with respect to one unit of bandwidth corresponding to subcarrier spacing of 15 kHz. See TS 36.213 [22], clause 11.1. This field is included only if UE supports MBMS reception from FeMBMS/Unicast mixed cell or MBMS-dedicated cell.

4.3.17.y *timeSeparationSlot2-r16, timeSeparationSlot4-r16*

These parameters define the supported time staggering length of 2 slots (MBSFN reference signal pattern type 2) / 4 slots (MBSFN reference signal pattern type 1) for MBSFN-RS associated with PMCH with subcarrier spacing of 0.37 kHz for MBSFN subframes as described in TS 36.211 [17], Clause 6.10.2.2.4. This field is included only if UE supports subcarrier spacing of 0.37 KHz for MBSFN subframes on FeMBMS/Unicast mixed cells or MBMS-Dedicated cells in addition to 15kHz subcarrier spacing.

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| Next change |

6 Optional features without UE radio access capability parameters

<skipped>

6.3 MBMS features

It is optional for UE to support MBMS procedures as specified in TS 36.331 [5].

6.3.1 MBMS Service Continuity

It is optional for UE to support MBMS Service Continuity for UEs supporting MBMS as specified in TS 36.331 [5].

6.3.2 MBMS reception with 256QAM

It is optional to support MBMS reception with 256QAM for UEs supporting MBMS. A UE which supports MBMS reception with 256QAM shall also support *dl-256QAM-r12* as specified in TS 36.331 [5], except UEs configured to operate in Receive Only Mode as defined in TS 23.246 [31].

6.3.x PBCH repetition in CAS

It is optional to support PBCH repetition in CAS for UEs supporting MBMS as specified in TS 36.211 [17]. A UE which supports PBCH repetition in CAS shall also support *fembmsDedicatedCell-r14* as specified in TS 36.331 [5].

6.3.y PDCCH AL16 for CAS in MBMS-dedicated cell

It is optional to support of PDCCH AL16 for CAS in MBMS-dedicated cell for UEs supporting MBMS as specified in TS 36.211 [17]. A UE which supports PDCCH AL16 for CAS in MBMS-dedicated cell shall also support *fembmsDedicatedCell-r14* as specified in TS 36.331 [5].

6.3.z Semi-static CFI indication in MIB

It is optional to support semi-static CFI indication in MIB for UEs supporting MBMS as specified in TS 36.331 [5]. A UE which supports semi-static CFI indication in MIB shall also support *fembmsDedicatedCell-r14* as specified in TS 36.331 [5].

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| End of change |