**3GPP TSG- Meeting #113 *1xxxx***

**Orlando, US, November 18-22,**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **6067** | **rev** | 1 | **Current version:** |  |  |
|  | | | | | | | | |
| *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 |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_terr\_bcast\_bands\_part2 | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | 8 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In Rel-18, new bands and channel bandwidths for LTE-based terrestrial broadcast have been introduced, however the performance requirements have not been extended to the new bandwidths. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Extending existing performance requirements for 10 MHz to new channel bandwidths 6/7/8 MHz | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The Rel-18 feature LTE\_terr\_bcast\_bands\_parts2 remains incomplete | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.4.1, A.3.1.1, A.3.8.1 FDD | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | |  | | |
| ***affected:*** | | **Y** |  | Test specifications | | | | **TS 36.521-1** | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2417773 | | | | | | | | |

==== Start of Change ====

10.4.1 Minimum requirement for PMCH decoding

10.4.1.1 Minimum requirement with 0.37kHz subcarrier spacing

The receive characteristic of MBMS is determined by the BLER.

For the parameters specified in Table 10.4.1.1-1 and Table A.3.8.1-9, the average downlink SNR shall be below the specified value for the BLER shown in Table 10.4.1.1-2.

**Table 10.4.1.1-1: Test Parameters for Testing**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** |  |
| Downlink power allocation |  | dB | 0 |
|  | dB | 0 (Note 1) |
| σ | dB | 0 |
| at antenna port | | dBm/15kHz | -98 |
| PDSCH transmission mode in PCell | |  | 1 |
| Subcarrier spacing for MBSFN cell | | kHz | 0.37 kHz |
| Bandwidth | | MHz | 10(Note 2) |
| Note 1: = 0.  Note 2: For both Pcell and Scell. | | | |

**Table 10.4.1.1-2: Minimum performance**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Cell** | **Bandwidth (MHz)** | **Reference Channel** | **MBSFN RS type** | **OCNG Pattern** | **Propagation**  **condition** | **Correlation Matrix and antenna** | **Reference value** | | **MBMS UE Category** |
| **BLER (%)** | **SNR(dB)** |
| 1 | PCell | 10 | N/A | N/A | OP.1 FDD | AWGN | 1x1 | N/A | N/A | N/A |
| MBMS Dedicated Cell | 10 | R.106-1 FDD | Type 1 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 18.5 | ≥ 2 |
| MBMS Dedicated Cell | 6 | R.106-3 FDD | Type 1 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 18.5 | ≥ 2 |
| MBMS Dedicated Cell | 7 | R.106-4 FDD | Type 1 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 18.5 | ≥ 2 |
| MBMS Dedicated Cell | 8 | R.106-5 FDD | Type 1 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 18.5 | ≥ 2 |
| 2 | PCell | 10 | N/A | N/A | OP.1 FDD | AWGN | 1x1 | N/A | N/A | N/A |
| MBMS Dedicated Cell | 10 | R.106-2  FDD | Type 2 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 20.2 | ≥ 2 |
| MBMS Dedicated Cell | 6 | R.106-6  FDD | Type 2 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 20.2 | ≥ 2 |
| MBMS Dedicated Cell | 7 | R.106-7  FDD | Type 2 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 20.2 | ≥ 2 |
| MBMS Dedicated Cell | 8 | R.106-8  FDD | Type 2 | N/A | MBSFN channel model (Table B.2.6.3-1) | 1x1 | 1 | 20.2 | ≥ 2 |

10.4.1.2 Minimum requirement with 2.5kHz subcarrier spacing

The receive characteristic of MBMS is determined by the BLER.

For the parameters specified in Table 10.4.1.2-1 and Tables A.3.8.1-10, the average downlink SNR shall be below the specified value for the BLER shown in Table 10.4.1.2-2.

**Table 10.4.1.2-1: Test Parameters for Testing**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** |  |
| Downlink power allocation |  | dB | 0 |
|  | dB | 0 (Note 1) |
| σ | dB | 0 |
| at antenna port | | dBm/15kHz | at antenna port |
| PDSCH transmission mode in PCell | |  | 1 |
| Subcarrier spacing for MBSFN cell | | kHz | 2.5 kHz |
| Bandwidth | | MHz | 10(Note 2) |
| Note 1: = 0.  Note 2: For both Pcell and Scell. | | | |

**Table 10.4.1.2-2: Minimum performance**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Cell** | **Bandwidth (MHz)** | **Reference Channel** | **OCNG Pattern** | **Propagation**  **condition** | **Correlation Matrix and antenna** | **Reference value** | | **MBMS UE Category** |
| **BLER (%)** | **SNR(dB)** |
| 1 | PCell | 10 | N/A | OP.1 FDD | AWGN | 1x2 low | N/A | N/A | N/A |
| MBMS Dedicated Cell | 10 | R.107 FDD | N/A | MBSFN channel model (Table B.2.6.4-1) | 1x2 low | 1 | 12.9 | ≥ 2 |
| MBMS Dedicated Cell | 6 | R.107-1 FDD | N/A | MBSFN channel model (Table B.2.6.4-1) | 1x2 low | 1 | 12.9 | ≥ 2 |
| MBMS Dedicated Cell | 7 | R.107-2 FDD | N/A | MBSFN channel model (Table B.2.6.4-1) | 1x2 low | 1 | 12.9 | ≥ 2 |
| MBMS Dedicated Cell | 8 | R.107-3 FDD | N/A | MBSFN channel model (Table B.2.6.4-1) | 1x2 low | 1 | 12.9 | ≥ 2 |

==== End of Change ====

==== Start of Change ====

A.3.1.1 Overview of DL reference measurement channels

**Table A.3.1.1-1O: Overview of DL reference measurement channels (PMCH Performance)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Duplex** | **Table** | **Name** | **BW** | **Mod** | **TCR** | **RB** | **RB Offset** | **UE Categ** | **Notes** |
| **FDD** | | | | | | | | | |
| FDD | Table A.3.8.1-1 | R.40 FDD | 1.4 | QPSK | 1/3 | 6 |  | ≥ 1 |  |
| FDD | Table A.3.8.1-1 | R.37 FDD | 10 | QPSK | 1/3 | 50 |  | ≥ 1 |  |
| FDD | Table A.3.8.1-2 | R.38 FDD | 10 | 16QAM | 1/2 | 50 |  | ≥ 1 |  |
| FDD | Table A.3.8.1-3 | R.39-1 FDD | 5 | 64QAM | 2/3 | 25 |  | ≥ 1 |  |
| FDD | Table A.3.8.1-3 | R.39 FDD | 10 | 64QAM | 2/3 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-4 | R.81-1 FDD | 10 | 16QAM | 1/2 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-4 | R.81-2 FDD | 10 | 64QAM | 2/3 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-5 | R.82-1 FDD | 10 | 16QAM | 1/2 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-6 | R.83-1 FDD | 10 | 16QAM | 1/2 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-6 | R.83-2 FDD | 10 | 64QAM | 2/3 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-7 | R.84-1 FDD | 10 | 16QAM | 1/2 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-8 | R.85-1 FDD | 3 | QPSK | 1/3 | 15 |  | ≥ 1 |  |
| FDD | Table A.3.8.1-8 | R.85-2 FDD | 5 | 16QAM | 1/2 | 25 |  | ≥ 1 |  |
| FDD | Table A.3.8.1-8 | R.85-3 FDD | 10 | 64QAM | 2/3 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-1 FDD | 10 | 64QAM | 0.48 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-2 FDD | 10 | 64QAM | 0.52 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-3 FDD | 6 | 64QAM | 0.49 | 30 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-4 FDD | 7 | 64QAM | 0.48 | 35 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-5 FDD | 8 | 64QAM | 0.48 | 40 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-6 FDD | 6 | 64QAM | 0.54 | 30 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-7 FDD | 7 | 64QAM | 0.53 | 35 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-9 | R.106-8 FDD | 8 | 64QAM | 0.52 | 40 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-10 | R.107 FDD | 10 | 16QAM | 0.46 | 50 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-10 | R.107-1 FDD | 6 | 16QAM | 0.46 | 30 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-10 | R.107-2 FDD | 7 | 16QAM | 0.46 | 35 |  | ≥ 2 |  |
| FDD | Table A.3.8.1-10 | R.107-3 FDD | 8 | 16QAM | 0.46 | 40 |  | ≥ 2 |  |
| **TDD** | | | | | | | | | |
| TDD | Table A.3.8.2-1 | R.40 TDD | 1.4 | QPSK | 1/3 | 6 |  | ≥ 1 |  |
| TDD | Table A.3.8.2-1 | R.37 TDD | 10 | QPSK | 1/3 | 50 |  | ≥ 1 |  |
| TDD | Table A.3.8.2-2 | R.38 TDD | 10 | 16QAM | 1/2 | 50 |  | ≥ 1 |  |
| TDD | Table A.3.8.2-3 | R.39-1 TDD | 5 | 64QAM | 2/3 | 25 |  | ≥ 1 |  |
| TDD | Table A.3.8.2-3 | R.39 TDD | 10 | 64QAM | 2/3 | 50 |  | ≥ 2 |  |

==== End of Change ====

==== Start of Change ====

A.3.8 Reference measurement channels for MBMS performance requirements

A.3.8.1 FDD

**Table A.3.8.1-9: Fixed Reference Channel for subcarrier spacing 0.37 kHz with 5G terrestrial broadcast MBMS dedicated cell**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **PMCH** | | | | | | | | |
| **Unit** | **Value** | | | | | | | |
| Reference channel |  | R.106-1 FDD | R.106-2  FDD | R.106-3 FDD | R.106-4 FDD | R.106-5 FDD | R.106-6  FDD | R.106-7  FDD | R.106-8  FDD |
| Channel bandwidth | MHz | 10 | 10 | 6 | 7 | 8 | 6 | 7 | 8 |
| Allocated resource blocks |  | 50 | 50 | 30 | 35 | 40 | 30 | 35 | 40 |
| Allocated slots per 40ms(Note1) |  | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Modulation |  | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM |
| Target Coding Rate |  | 0.48 | 0.52 | 0.49 | 0.48 | 0.48 | 0.54 | 0.53 | 0.52 |
| Information Bit Payload (Note 2) |  |  |  |  |  |  |  |  |  |
| For each slot | Bits | 63776 | 63776 | 39232 | 45532 | 51024 | 39232 | 45532 | 51024 |
| Number of Code Blocks per Sub-Frame (Note 3) |  | 11 | 11 | 7 | 8 | 9 | 7 | 8 | 9 |
| Binary Channel Bits Per Subframe |  |  |  |  |  |  |  |  |  |
| For each slot | Bits | 133650 | 121500 | 80190 | 93555 | 106920 | 72900 | 85050 | 97200 |
| MBMS UE Category |  | ≥ 2 | ≥ 2 | ≥ 2 | ≥ 2 | ≥ 2 | ≥ 2 | ≥ 2 | ≥ 2 |
| Note 1: First subframe of every 40ms is allocated for non-MBMS transmission.  Note 2: Zero OFDM symbols are reserved for PDCCH; and no CRS allocated as per TS 36.211 [4].  Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). | | | | | | | | | |

**Table A.3.8.1-10: Fixed Reference Channel for subcarrier spacing 2.5 kHz with 5G terrestrial broadcast MBMS dedicated cell**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **PMCH** | | | | | | |
| **Unit** | **Value** | | | | | |
| Reference channel |  |  | R.107 FDD | R.107-1 FDD | R.107-2 FDD | R.107-3 FDD |  |
| Channel bandwidth | MHz |  | 10 | 6 | 7 | 8 |  |
| Allocated resource blocks |  |  | 50 | 30 | 35 | 40 |  |
| Allocated subframes per 40ms(Note1) |  |  | 39 | 39 | 39 | 39 |  |
| Modulation |  |  | 16QAM | 16QAM | 16QAM | 16QAM |  |
| Target Coding Rate |  |  | 0.46 | 0.46 | 0.46 | 0.46 |  |
| Information Bit Payload (Note 2) |  |  |  |  |  |  |  |
| For each subframes | Bits |  | 9912 | 5992 | 6968 | 7992 |  |
| Number of Code Blocks per Sub-Frame (Note 3) |  |  | 2 | 1 | 2 | 2 |  |
| Binary Channel Bits Per Subframe |  |  |  |  |  |  |  |
| For each subframes | Bits |  | 21600 | 12960 | 15120 | 172800 |  |
| MBMS UE Category |  |  | ≥ 2 | ≥ 2 | ≥ 2 | ≥ 2 |  |
| Note 1: First subframe of every 40ms is allocated for non-MBMS transmission.  Note 2: Zero OFDM symbols are reserved for PDCCH; and no CRS allocated as per TS 36.211 [4].  Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). | | | | | | | |

==== End of Change ====