3GPP TSG RAN WG1 Meeting #101-e R1-200xxxx

e-Meeting, May 25th – Jun 5th, 2020

**Agenda item:** 6.2.4

**Source:** Moderator (Qualcomm Incorporated)

**Title:** Summary of issues for LTE-based 5G terrestrial broadcast

**Document for:** Discussion and Decision

# Summary of issues

The following corrections have been submitted to this meeting:

* [Issue #1: Approval of editor CR for TS 36.201](#_Toc40694731)
* [Issue #2: Control region length related issues](#_Toc40694732)
* [Issue #3: Semistatic CFI](#_Toc40694737)
* [Issue #4: Categories for 0.37kHz SCS](#_Toc40694738)

# Issue #1: Approval of editor CR for TS 36.201

In x4200, the editor submitted the CR to capture the TP agreed in RAN1#100b-e. It is the moderator’s view that this does not need to be discussed during the e-meeting and can be handled directly in the editor CR phase.

# Issue #2: Control region length related issues

In x4667 and x4163 it is proposed to modify Table 6.7-1 to specify that the new numerologies have 0 symbols for control. The TPs are slightly different but have the same intention.

**<TP 2.1 Alt1, TS36.211>**

6.7 Physical control format indicator channel

The physical control format indicator channel carries information about the number of OFDM symbols used for transmission of PDCCHs in a subframe. The set of OFDM symbols possible to use for PDCCH in a subframe is given by Table 6.7-1.

**Table 6.7-1: Number of OFDM symbols used for PDCCH**

|  |  |  |
| --- | --- | --- |
| **Subframe** | **Number of OFDM symbols for PDCCH when**  | **Number of OFDM symbols for PDCCH when**  |
| Subframe 1 and 6 for frame structure type 2 or a subframe for frame structure type 3 with the same duration as the DwPTS duration of a special subframe configuration | 1, 2 | 2 |
| MBSFN subframes with  and configured with 1 or 2 cell-specific antenna ports | 1, 2 | 2 |
| MBSFN subframes with  and configured with 4 cell-specific antenna ports | 2 | 2 |
| MBSFN subframes with , ,  or  | 0 | 0 |
| Non-MBSFN subframes (except subframe 6 for frame structure type 2) configured with positioning reference signals | 1, 2, 3 | 2, 3 |
| All other cases | 1, 2, 3 | 2, 3, 4 |

The UE may assume the PCFICH is transmitted when the number of OFDM symbols for PDCCH is greater than zero unless stated otherwise in [4, clause 12].

**</TP>**

**<TP 2.1 Alt2, TS36.211>**

**6.7 Physical control format indicator channel**

The physical control format indicator channel carries information about the number of OFDM symbols used for transmission of PDCCHs in a subframe. The set of OFDM symbols possible to use for PDCCH in a subframe is given by Table 6.7-1.

**Table 6.7-1: Number of OFDM symbols used for PDCCH**

|  |  |  |
| --- | --- | --- |
| **Subframe** | **Number of OFDM symbols for PDCCH when**  | **Number of OFDM symbols for PDCCH when**  |
| Subframe 1 and 6 for frame structure type 2 or a subframe for frame structure type 3 with the same duration as the DwPTS duration of a special subframe configuration | 1, 2 | 2 |
| MBSFN subframes with  and configured with 1 or 2 cell-specific antenna ports | 1, 2 | 2 |
| MBSFN subframes with  and configured with 4 cell-specific antenna ports | 2 | 2 |
| MBSFN subframes with , ,  or MBSFN slots with  | 0 | 0 |
| Non-MBSFN subframes (except subframe 6 for frame structure type 2) configured with positioning reference signals | 1, 2, 3 | 2, 3 |
| All other cases | 1, 2, 3 | 2, 3, 4 |

The UE may assume the PCFICH is transmitted when the number of OFDM symbols for PDCCH is greater than zero unless stated otherwise in [4, clause 12].

**</TP>**

Additionally, x3535 proposes the following TP to correct the determination of starting symbol:

**<TP 2.2, TS36.211>**

1.
2.
3.
4.

**6.5 Physical multicast channel**

The physical multicast channel shall be processed and mapped to resource elements as described in clause 6.3 with the following exceptions:

- No transmit diversity scheme is specified.

- Layer mapping and precoding shall be done assuming a single antenna port and the transmission shall use antenna port 4.

- The PMCH can only be transmitted in the MBSFN region.

 - For PMCH with  other than , the index  in the first slot in the MBSFN subframe fulfils,

 - For PMCH with , the index  in the slot of the MBSFN region fulfils .

 - where is equal to the value given by the higher layer parameter *non-MBSFNregionLength* [9].

- The PMCH shall use extended cyclic prefix.

- The PMCH is not mapped to resource elements used for transmission of MBSFN reference signals.

- In clause 6.3.1, for Δ*f* = 1.25 kHz and Δ*f* ≈ 0.37 kHz, the scrambling generator shall be initialised at the start of each slot.

- For  the following exception applies to clause 6.3.5:

- The text “which meet all of the following criteria in the current subframe” shall be replaced by “which meet all of the following criteria in the current slot”

- The mapping to resource elements on antenna port not reserved for other purposes shall be in increasing order of first the index over the assigned physical resource blocks and then the index .

**</TP>**

Also, note the following CR submitted to Rel-14 CR (there is a clash with TP 2.2):

< Unchanged parts are omitted >

6.5 Physical multicast channel

The physical multicast channel shall be processed and mapped to resource elements as described in clause 6.3 with the following exceptions:

- No transmit diversity scheme is specified.

- Layer mapping and precoding shall be done assuming a single antenna port and the transmission shall use antenna port 4.

- The PMCH can only be transmitted in the MBSFN region of an MBSFN subframe. The index  in the first slot in the MBSFN subframe fulfils , where

 - if the higher layer parameter *subcarrierSpacingMBMS* is configured

 - is equal to 0

 - otherwise,

- is equal to the value given by the higher layer parameter *non-MBSFNregionLength* [9].

- The PMCH shall use extended cyclic prefix.

- The PMCH is not mapped to resource elements used for transmission of MBSFN reference signals.

 < Unchanged parts are omitted >

# Issue #3: Semistatic CFI

In x3786 and x4667, the following TPs are proposed:

* “Shall” vs “may” (x3786) for applicability of semistatic CFI
* Alignment with RAN2 specs (x4667)

**<TP 3.1 36.213>**

For a MBMS-dedicated cell, if a UE is configured with higher layer parameter *semistaticCFI* included in *MasterInformationBlock-MBMS*, the UE may assume the CFI is equal to the value of the higher layer parameter *semistaticCFI* for non-MBSFN subframes.

**</TP>**

**<TP 3.2 36.213>**

**9.1.3 Control Format Indicator (CFI) assignment procedure**

For a serving cell, if a UE is configured with higher layer parameter *semiStaticCFI-SlotSubslotNonMBSFN*, the UE shall assume the CFI is equal to the value of the higher layer parameter *semiStaticCFI-SlotSubslotNonMBSFN* for non-MBSFN subframes for receiving physical downlink shared channel with slot/subslot duration.

-------------------------- Other parts are omitted -----------------------------

For a MBMS-dedicated cell, if a UE is configured with higher layer parameter *semiStaticCFI-MBMS* included in *MasterInformationBlock-MBMS*, the UE shall assume the CFI is equal to the value of the higher layer parameter *semiStaticCFI-MBMS* for non-MBSFN subframes if a non-zero value is indicated by *semiStaticCFI-MBMS*.

**</TP>**

# Issue #4: Categories for 0.37kHz SCS

In x3785, it is proposed to send an LS to RAN2 to update TS 36.306 with the new larger TBS value. RAN1 would need to endorse a TP and send it to RAN2 to implement the CR. The proposed TP is as follows:

**<===================================== TP 4.1 36.306 =============================>**

4.1 *ue-Category*

**<Unchanged parts are omitted>**

Table 4.1-4: Maximum number of bits of a MCH transport block received within a TTI set by the field *ue-Category* for an MBMS capable UE capable of reception via MBSFN

|  |  |
| --- | --- |
| UE Category | Maximum number of bits of a MCH transport block received within a TTI |
| Category 1 | 10296 |
| Category 2 | 51024 |
| Category 3 | 75376226416 (0.37kHz) |
| Category 4 | 75376226416 (0.37kHz) |
| Category 5 | 75376226416 (0.37kHz) |
| Category 6 | 75376226416 (0.37kHz) |
| Category 7 | 75376226416 (0.37kHz) |
| Category 8 | 75376226416 (0.37kHz) |
| Category 9 | 75376226416 (0.37kHz) |
| Category 10 | 75376226416 (0.37kHz) |
| Category 11 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| Category 12 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |

**<Unchanged parts are omitted>**

4.1A *ue-CategoryDL* and *ue-CategoryUL*

**<Unchanged parts are omitted>**

Table 4.1A-4: Maximum number of bits of a MCH transport block received within a TTI set by the field *ue-CategoryDL* for an MBMS capable UE capable of reception via MBSFN

|  |  |
| --- | --- |
| UE DL Category | Maximum number of bits of a MCH transport block received within a TTI |
| DL Category M1 | NA |
| DL Category M2 | NA |
| DL Category 0 | 4584 |
| DL Category 1bis | 10296 |
| DL Category 4 | 75376226416 (0.37kHz) |
| DL Category 6 | 75376226416 (0.37kHz) |
| DL Category 7 | 75376226416 (0.37kHz) |
| DL Category 9 | 75376226416 (0.37kHz) |
| DL Category 10 | 75376226416 (0.37kHz) |
| DL Category 11 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 12 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 13 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 14 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 15 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 16 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 17 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 18 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 19 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 20 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |
| DL Category 21 | 75376 (64QAM)97896 (256QAM)226416 (64QAM 0.37kHz)293736 (256QAM 0.37kHz) |

**<=====================================End TP 4.1 =============================>**

# Proposed scope of email discussions

Issues 2 and 3 are related to PDCCH/CFI, and it is the moderator’s view that they should not be very controversial (probably we just need to discuss wording, the proposals should implement the common understanding in RAN1).

Issue 4 is new and may require some additional discussion in RAN1 before liaising with RAN2.

Thus, it is proposed to have two email discussions as follows.

**Proposal: The scope of email discussion for RAN1#101 is as follows:**

* **Email discussion #1: Issues related to control region and CFI (including TP 2.1, 2.2, 3.1, 3.2).**
	+ **Moderator will provide consolidated TPs based on the input to this meeting.**
	+ **For TP 2.2, collision with Rel-14 CR in x4162 should be taken into account.**
* **Email discussion #2: UE categories and 0.37kHz numerology.**
	+ **Discuss TP 4.1 and potential LS to RAN2.**
* **Approval of the editor CR in x4200 will be handled with the endorsement of other editor CRs after the meeting.**

# References

|  |  |  |
| --- | --- | --- |
| [R1-2004667](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2004667.zip) (revision of [R1-2003337](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2003337.zip)) | Control region for the new numerologies of LTE-based 5G terrestrial broadcast | ZTE, ABS |
| [R1-2003535](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2003535.zip) | Corrections to 36.211 for the 0.37 kHz subcarrier spacing MBSFN | Huawei, HiSilicon |
| [R1-2003785](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2003785.zip) | Support of longer numerologies for rooftop reception | Qualcomm Incorporated |
| [R1-2003786](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2003786.zip) | Corrections for CAS reception | Qualcomm Incorporated |
| [R1-2004163](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2004163.zip) | Corrections to 36.211 for the 2.5 kHz subcarrier spacing MBSFN | Huawei, HiSilicon |
| [R1-2004200](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2004200.zip) | Corrections to LTE-based 5G terrestrial broadcast | Nokia, Nokia Shanghai Bell |