**3GPP TSG RAN WG1 #102-e R1-200xxxx**

**e-Meeting, August 17th – 28th, 2020**

**Agenda item:** 6.2.4

**Source:** Moderator (Qualcomm Incorporated)

**Title:** Summary of 102-e-LTE\_TerrBcast-02

**Document for:** Discussion and Decision

# Issue #1: Indexing of PBCH scrambling

In x6190, it is proposed to change the indexing from *k* to *k’* in the PBCH scrambling as follows:

|  |  |
| --- | --- |
| ***Reason for change:*** | The current PBCH scrambling is given by  However, *k* (aboslute subcarrier index) is not known before decoding PBCH. |
|  |  |
| ***Summary of change:*** | PBCH repetition is scrambled based on *k’* (as defined in 6.6.4)*,* not *k* |
|  |  |
| ***Consequences if not approved:*** | PBCH repetitions cannot be used until after decoding PBCH. |

**<TP2, 36.211>**

**<Omitted in summary>**

6.6.4.1 PBCH repetition in the cell acquisition subframe

**<Omitted in summary>**

Resource elements already reserved or used for transmission of cell-specific reference signals in absence of repetition shall not be used for additional mapping of cell-specific reference signals.

The quantity is given by

where the relationship between and is defined in clause 6.6.4, and the pseudo-random sequence is given by clause 7.2 and initialized for each OFDM symbol with

**Table 6.6.4.1-1: Slot and symbol number pair for repetition of PBCH.**

|  |  |  |
| --- | --- | --- |
|  | **Slot and symbol number pair** | |
| **Normal cyclic prefix** | **Extended cyclic prefix** |
| 0 | (0, 4) | - |
| 1 | (1, 4) | (0, 3) |
| 2 | (1, 5) | (1, 4) |
| 3 | (0, 3), (1, 6) | (1, 5) |

**</TP2 >**

**Comments on TP2:**

|  |  |
| --- | --- |
| Company | Input |
| Qualcomm | Agree the TP. |
| ZTE | We are ok with the TP. |
| BBC | We agree with the TP. |
| Huawei, HiSilicon | Ok with the TP. |

# Issue #2: Corrections for 0.37 SCS (subframe/slot)

In x6416 the following TP is proposed to discuss the relationship between slots/subframes for 0.37 kHz SCS:

**<TP3, 36.211>**

**6 Downlink**

**6.1 Overview**

The smallest time-frequency unit for downlink transmission is denoted a resource element and is defined in clause 6.2.2.

A subset of the downlink subframes in a radio frame can be configured as MBSFN subframes by higher layers. Each MBSFN subframe is divided into a non-MBSFN region and an MBSFN region. For MBSFN slot with , the duration of the slot spans three consecutive MBSFN subframes.

- For subframes using , the non-MBSFN region spans the first one or two OFDM symbols in an MBSFN subframe where the length of the non-MBSFN region is given according to Clause 6.7.

- For subframes using , , , or slot using , the non-MBSFN region is of zero size.

- The MBSFN region in an MBSFN subframe is defined as the OFDM symbols not used for the non-MBSFN region. For the MBSFN region is defined as one slot of 3 ms.

For an MBMS-dedicated cell, subframes where PSS/SSS/PBCH or PDSCH carrying system information are transmitted with  are non-MBSFN subframes.

For frame structure type 3, MBSFN configuration shall not be applied to downlink subframes in which at least one OFDM symbol is not occupied or discovery signal is transmitted.

Unless otherwise specified, transmission in each downlink subframe shall use the same cyclic prefix length as used for downlink subframe #0.

**< Unchanged parts are omitted >**

**6.10.2 MBSFN reference signals**

MBSFN reference signals shall be transmitted in the MBSFN region of MBSFN subframes/slots only when the PMCH is transmitted. MBSFN reference signals are transmitted on antenna port 4.

For an MBMS-dedicated carrier configured with a single MBSFN area, and for a PMCH transmitted with 0.37 kHz subcarrier spacing in slot , which is indicated to contain MCCH by higher layer parameter *MCCH-Config:*

- for MBSFN reference signal pattern type 1, the UE may assume that MBSFN reference signals associated with the same are present in the three preceding slots to slot .

- for MBSFN reference signal pattern type 2, the UE may assume that MBSFN reference signals associated with the same are present in the preceding slot to slot .

MBSFN reference signals are defined for extended cyclic prefix only.

**</TP3>**

**Comments on TP3:**

|  |  |
| --- | --- |
| Company | Input |
| Qualcomm | On the first change “the duration of the slot spans three consecutive MBSFN subframes”, we think this is clear from TS 36.211, 4.1:  For transmissions using , a slot has a length of 92160. There are 13 slots, numbered in increasing order from 0 to 12, in a 40 ms period starting at with slot 0 starting at in the 40 ms period.  On the second change, we agree with it with a minor change (slot -> slot**s**):  For subframes using , , , or slots using , the non-MBSFN region is of zero size.  The third change looks OK. |
| ZTE | We tend to agree with Qualcomm that the first change may be not needed. We are ok with the second change (with Qualcomm’s updates) and the third change. |
| BBC | We think either option is ok, but we have a slight preference to the changes suggested by Qualcomm and ZTE. |
| Huawei, HiSilicon | I’d like to clarify a bit more for the motivation of the change:  I was trying to fix the awkward description of the “MBSFN region” and “MBSFN subframe” for 0.37 SCS in the following sentence. The subframe is 1ms but the region is a slot of 3ms, it is impossible to define a 3ms-region in 1ms-subframe. Therefore, it might be helpful to clarify the relation between the slot and the subframe at the beginning in this clause 6.1 as the first suggested change. We welcome other changes to fix it if our TP is not agreeable.  “The MBSFN region in an MBSFN subframe is defined as the OFDM symbols not used for the non-MBSFN region. For the MBSFN region is defined as one slot of 3 ms”  Ok with the modification of the second change from Qualcomm. |
| Qualcomm | Thanks Jinhuan for the clarification. Maybe we can try the following?  **<TP3-V2, 36.211>**  A subset of the downlink subframes in a radio frame can be configured as MBSFN subframes by higher layers. For the MBSFN region is defined as one slot of 3 ms. Except for , each MBSFN subframe is divided into a non-MBSFN region and an MBSFN region.  - For subframes using , the non-MBSFN region spans the first one or two OFDM symbols in an MBSFN subframe where the length of the non-MBSFN region is given according to Clause 6.7.  - For subframes using , , , or slots using , the non-MBSFN region is of zero size.  - The MBSFN region in an MBSFN subframe is defined as the OFDM symbols not used for the non-MBSFN region.  **<TP3-V2, 36.211>** |

# Conclusion

<To be completed after discussion>