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

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

**Title: [DRAFT]** LS Updates to TS 36.300 on terrestrial broadcast

**Response to:**

**Release:** Release 16

**Work Item:** LTE\_terr\_bcast-Core

**Source:** **Qualcomm Incorporated** [RAN1]

**To:** RAN2

**Cc:**

**Contact Person:**

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**1. Overall Description:**

RAN1 discussed an update to TS 36.300 to incorporate the new numerologies defined in Rel-16. RAN1 endorsed (from RAN1 perspective) the following text proposal:

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| 5.1.1 Basic transmission scheme based on OFDM  The downlink transmission scheme is based on conventional OFDM using a cyclic prefix. The OFDM sub-carrier spacing is *Δf* = 15 kHz. 12 consecutive sub-carriers during one slot correspond to one downlink *resource block*. In the frequency domain, the number of resource blocks, NRB, can range from NRB-min = 6 to NRB-max = 110 per CC or per Cell in case of CA or DC.  In addition, there are also four reduced sub-carrier spacings, *Δflow* = 7.5 kHz, *Δflow1* = 2.5 kHz, *Δflow2* = 1.25 kHz and *Δflow3* ≈ 0.37 kHz for both MBMS-dedicated cell and MBMS/Unicast-mixed cell.  In the case of 15 kHz sub-carrier spacing there are two cyclic-prefix lengths, corresponding to seven and six OFDM symbols per slot respectively.  - Normal cyclic prefix: TCP = 160×Ts (OFDM symbol #0) , TCP = 144×Ts (OFDM symbol #1 to #6)  - Extended cyclic prefix: TCP-e = 512×Ts (OFDM symbol #0 to OFDM symbol #5)  where Ts = 1/ (2048 × Δf)  In the case of 7.5 kHz sub-carrier spacing, there is only a single cyclic prefix length TCP-low = 1024×Ts, corresponding to 3 OFDM symbols per slot.  In the case of 2.5 kHz sub-carrier spacing, there is only a single cyclic prefix length TCP-low1 = 3072×Ts, corresponding to 1 OFDM symbol per slot.  In the case of 1.25 kHz sub-carrier spacing, there is only a single cyclic prefix length TCP-low2 = 6144×Ts, corresponding to 1 OFDM symbol per subframe.  In the case of 0.37 kHz sub-carrier spacing, there is only a single cyclic prefix length TCP-low3 = 9216×Ts, corresponding to 1 OFDM symbol per 3ms slot.  In the case of FDD, operation with half duplex from UE point of view is supported.  <---------------------------Other parts are omitted -------------------------------> |

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| 5.1.4 Downlink Reference signal and synchronization signals  The downlink cell-specific reference signals consist of known reference symbols inserted in the first and third last OFDM symbol of each slot for antenna port 0 and 1. There is one cell-specific reference signal transmitted per downlink antenna port. The number of downlink antenna ports for the transmission of cell-specific reference signals equals 1, 2, or 4.  Physical layer provides 504 unique cell identities using Synchronization signals and resynchronization signals.  The downlink MBSFN reference signals consist of known reference symbols inserted every other sub-carrier in the 3rd, 7th and 11th OFDM symbol of sub-frame in case of 15kHz sub-carrier spacing and extended cyclic prefix; every four subcarriers in the 2nd, 4th and 6th symbol of sub-frame in case of 7.5kHz sub-carrier spacing; every four subcarriers in the single symbol of slot in case of 2.5kHz sub-carrier spacing; every six subcarriers in the single symbol of subframe in case of 1.25kHz sub-carrier spacing; and every twelve subcarriers for MBSFN reference signal pattern type 1 or every six subcarriers for MBSFN reference signal pattern type 2 in the single symbol of 3ms slot in case of 0.37kHz sub-carrier spacing.  In addition to cell-specific reference signals and MBSFN reference signals, the physical layer supports UE-specific reference signals, positioning reference signals, CSI reference signals, and discovery signals.  A UE may assume presence of the discovery signals consisting of cell-specific reference signals, primary and secondary synchronization signals, configurable resynchronization signals, and configurable CSI reference signals.  <---------------------------Other parts are omitted -------------------------------> |

**2. Actions:**

**To RAN2 group.**

**ACTION:** RAN1 respectfully requests RAN2 to implement the above text proposal.

**3. Date of Next TSG-RAN WG1 Meetings:**

TSG-RAN WG1 Meeting #103-e 2020-10-26 / 2020-11-13