3GPP TSG-RAN WG4 Meeting #116bis R4-2515068

Prague, CZ, 13th – 17th October, 2025

**Title:** WF on [116bis][313] 5G\_Broadcast\_GSO

**Agenda item:** 6.5.1

**Source:** Astrum Mobile, ZTE, Qualcomm

**Document for:** Approval

# Topic #1: SAN conformance requirements

**Issue 1-1-1: Motivation for conformance test specification for 36.181**

* Agreement:
	+ RAN4 recommends specifying SAN conformance requirements for LTE 5G broadcast over GSO
		- RAN4 can start SAN conformance related discussion from RAN4#117
		- WID needs to be updated in RAN#110 to include TS 36.181 as impacted specification.

**Issue 1-1-2: SAN conformance requirements**

* Agreement:
	+ Take the Table 1 and 2 as baseline.
	+ RAN4 to further investigate possible required changes for TS 36.181

**Table 1 General requirements for NTN broadcast band**

|  |  |
| --- | --- |
| **Requirements in TS 36.181** | **Expected impact** |
| 4 General test conditions and declarations |  |
| 4.1 Measurement uncertainties and test requirements | 1. Need to add max test system uncertainty with 100kHz for 10MHz occupied bandwidth in Table 4.1.2.2-1.2. Need to add 9MHz AWGN bandwidth in Table 4.1.2.3-1. |
| 4.2 Requirement reference points | No specification impact. |
| 4.3 Satellite Access Node classes | No specification impact. |
| 4.4 Regional requirements | No specification impact. |
| 4.5 SAN configurations | No specification impact. |
| 4.6 Manufacturer declarations | No specification impact. |
| 4.7 Test configurations | The carrier bandwidth in section 4.7.3.1 needs to be updated. |
| 4.8 Applicability of requirements | No specification impact. |
| 4.9 RF channels and test models | The carrier bandwidth in section 4.9.2.2 needs to be updated. |
| 4.10 Requirements for contiguous and non-contiguous spectrum | No specification impact. |
| 4.11 Requirements for SAN capable of multi-band operation | No specification impact. |
| 4.12 Reference coordinate system | No specification impact. |
| 4.13 Format and interpretation of tests | No specification impact. |

**Table 2 RF requirements for NTN broadcast band**

|  |  |
| --- | --- |
| **Requirements in TS 36.181** | **Expected impact** |
| 6 Conducted transmitter characteristics |  |
| 6.1 General | Need to add BOG. |
| 6.2 Satellite Access Node output power | No specification impact. |
| 6.3 Output power dynamics |  |
| 6.3.1 General | No specification impact. |
| 6.3.2 RE power control dynamic range | No specification impact. |
| 6.3.3 Total power dynamic range | Need to add 10MHz SAN channel bandwidth in Table 6.3.3.5-1. |
| 6.4 Transmit ON/OFF power | No specification impact. |
| 6.5 Transmitted signal quality |  |
| 6.5.1 General | No specification impact. |
| 6.5.2 Frequency error | No specification impact. |
| 6.5.3 Modulation quality | Need to add EVM requirement for BOG in section 6.5.3.5. |
| 6.5.4 Time alignment error | No specification impact. |
| 6.5.5 DL RS power | Need to specify that this requirement is not applicable to BOG. |
| 6.6 Unwanted emissions |  |
| 6.6.1 General | No specification impact. |
| 6.6.2 Occupied bandwidth | Need to add 10MHz in Table 6.6.2.4.2-1. |
| 6.6.3 Adjacent Channel Leakage Power Ratio (ACLR) | Need to add 10MHz in Table 6.6.3.5-1. |
| 6.6.4 Out-of-band emissions | No specification impact. |
| 6.6.5 Transmitter spurious emissions | No specification impact. |
| 6.7 Transmitter intermodulation | No specification impact. |

# Topic #2: UE demodulation requirements

**Issue 2-1-1: Test parameters**

* Agreement:
	+ Take the parameters listed below as baseline to define PMCH demodulation requirements.
		- SCS: 15kHz
		- Channel bandwidth: 10MHz
		- Modulation: Rank 1 with QPSK, Rank 1 with 16QAM
		- Antenna configuration: 1x2 low
		- BLER test point: 1% of BLER.
		- Other test parameters in Table 3

**Table 3: Test Parameters for Testing**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Test 1-4** |
| Downlink power allocation |  | dB | 0 |
|  | dB | 0 (Note 1) |
| σ | dB | 0 |
| at antenna port | dBm/15kHz | -98 |
| Bandwidth  | MHz | 10MHz |
| Note 1: . |

**Issue 2-1-2: Fixed reference channel**

* Agreement:
	+ Take the following fixed reference channel in Table 4 as baseline for 5G broadcast over GSO UE demodulation requirements definition, which is for 15kHz subcarrier spacing for MBMS dedicated cell.

**Table 4 Fixed Reference Channel for PMCH Receiver Requirements (15 kHz SCS)**

|  |  |
| --- | --- |
| Parameter | PMCH (15 kHz SCS) |
| Unit | Value |
| Reference channel |   | R.x.1 | R.x.2 |
| PMCH bandwidth  | MHz | 10 | 10 |
| Allocated resource blocks |   | 50 | 50 |
| Allocated subframes per Radio Frame(Note1) |   | 10 | 10 |
| Modulation |   | QPSK | 16QAM |
| Target Coding Rate |   | 1/3 | 1/2 |
| Information Bit Payload (Note 2) |   |   |  |
| For Sub-Frames 0,1,2,3,4,5,6,7,8,9 | Bits | 3624 | 9912 |
| Number of Code Blocks per Sub-Frame (Note 3) |   | 1 | 2 |
| Binary Channel Bits Per Subframe |   |   |   |
| For Sub-Frames 0,1,2,3,4,5,6,7,8,9 | Bits | 10200 | 20400 |
| MBMS UE Category |   | ≥ 1 | ≥ 1 |
| Note 1: For FDD mode, all 10 subframes are available for MBMS, in line with TS 36.331.Note 2: 2 OFDM symbols are reserved for PDCCH; and no CRS allocated as per TS 36.211.Note 2: 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). |

**Issue 2-1-3: Propagation condition**

* Agreement:
	+ RAN4 to use the following NTN-TDLC (DS=5ns) channel model parameters as the propagation condition for 5G broadcast over GSO demodulation requirements definition.

**Table 5: Delay profiles for 5G broadcast over GSO channel models**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Model** | **Delay spread (r.m.s.)** | **Delay resolution** |
| LOS | NTN-TDLC5 | 5 ns | 5 ns |

**Table 6 NTN-TDLC5 (DS = 5 ns)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay [ns]** | **Power [dB]** | **Fading distribution** |
| 1 | 0 | -0.6 | LOS path |
| 0 | -8.9 | Rayleigh |
| 2 | 60 | -21.5 | Rayleigh |
| Note 1: Tap #1 follows a Rician distribution. |

**Table 7: Channel model parameters for 5G broadcast over GSO channel models**

|  |  |  |
| --- | --- | --- |
| **Combination name** | **Model** | **Maximum Doppler frequency** |
| NTN-TDLC5-5 | NTN-TDLC5 | 5 Hz |