**3GPP TSG-RAN WG4 Meeting #116 R4-25xxxxx**

**Bengaluru, India, August 25th – 29th, 2025**

**Agenda item:** 7.22.1

**Source:** Moderator (CMCC)

**Title:** Adhoc minutes for [116][134] A-IoT\_device

**Document for:** Information

# Introduction

**Discuss the following topics in adhoc session:**

* **Issue 3-3-1: spurious emission requirements**
* **Issue 3-1-1: Transmit output power**
* **Issue 3-2-1: SFO requirement**
* **Issue 2-1-1: R2D transmission bandwidth**

# System parameters

## Topic 2-1: R2D bandwidth

**Issue 2-1-1: R2D transmission bandwidth**

Online Agreement:

Define asymmetric guard band as below.

**Table : Minimum guardband (kHz)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R2D CBW** | **200kHz** | **400kHz** | **600kHz** | **800kHz** |
| Minimum guardband(kHz) | [2.5] | [12.5] | [22.5] | [32.5] |

Offlineagreement:

Define asymmetric guard band as below

**Table : Minimum guardband (kHz)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R2D CBW** | **200kHz** | **400kHz** | **600kHz** | **800kHz** |
| Minimum guardband(kHz) | [2.5] | [12.5] | [22.5] | [32.5] |

## Topic 2-2: D2R bandwidth

**Issue 2-2-1: D2R bandwidth**

Offline agreement

* Following equations will be captured as informative Annex in TS.

|  |
| --- |
| Using the following equation for BS D2R CBW:D2R CBW for BS (kHz)= ceiling ((2SB Transmission BW\_without SFO× (1/2) +2× Small frequency shift\_without SFO)/0.9)=ceiling ((2000×(1+R)/Tb) × (1+∣SFO∣)/0.9)=ceiling ((1000×(R+1)/ (Tc ×R)) × (1+∣SFO∣)/0.9) (Eq. 4)The transmission bandwidth (BW) and small frequency shift are in kHz, while Tc and Tb are in μs. The 0.9 divisor presents the 90% BS filter spectrum utility (10% guard band). |
| Using following equation for device D2R CBW D2R CBW for device (kHz)=ceiling (2SB Transmission BW\_without SFO× (1/2) +2× Small frequency shift\_without SFO)=ceiling ((2000×(1+R)/Tb) × (1+∣SFO∣))=ceiling ((1000×(R+1)/ (Tc ×R)) × (1+∣SFO∣)) (Eq. 5)The transmission bandwidth (BW) and small frequency shift are in kHz, while Tc and Tb are in μs. |

* + Capture the following channel bandwidth tables in TS:

|  |
| --- |
| **Device D2R channel bandwidth (kHz)**  |
| **Norminal D2R transmission** **Bandwidth without SFO(kHz)** | **Norminal Small frequency shift without SFO(kHz)** |
| **3.75**  | **7.5**  | **15**  | **30**  | **60** | **120**  | **240** | **480** | **720**  |
| **15** | 17 | 25 | 42 | 75 | 141 | 273 | 534 | 1065 |  |
| **30** | 　 | 33 | 50 | 83 | 149 | 281 | 545 | 1073 |  |
| **60** | 　 | 　 | 66 | 99 | 165 | 297 | 561 | 1089 |  |
| **120** | 　 | 　 |  | *132* | *198* | *330* | *594* | *1122* |  |
| **240** | 　 | 　 | 　 |  | *264* | *396* | *660* | *1188* |  |
| **480** | 　 | 　 | 　 | 　 |  | *528* | *792* | *1320* |  |
| **960** | 　 | 　 | 　 | 　 | 　 |  | *1056* | *1584* |  |
| **2880** | 　 | 　 | 　 | 　 | 　 | 　 | 　 |  | *3168* |

|  |
| --- |
| **BS D2R channel bandwidth (kHz)**  |
| **Norminal D2R transmission** **Bandwidth without SFO (kHz)** | **Norminal Small frequency shift without SFO(kHz)** |
| **3.75**  | **7.5**  | **15**  | **30**  | **60** | **120**  | **240** | **480** | **720**  |
| **15** | 19 | 28 | 46 | 83 | 156 | 303 | 596 | 1183 |  |
| **30** | 　 | 37 | 55 | 92 | 165 | 312 | 605 | 1192 |  |
| **60** | 　 | 　 | 74 | 110 | 184 | 330 | 624 | 1210 |  |
| **120** | 　 | 　 |  | 147 | 220 | 367 | 660 | 1247 |  |
| **240** | 　 | 　 | 　 |  | 294 | 440 | 734 | 1320 |  |
| **480** | 　 | 　 | 　 | 　 |  | 587 | 880 | 1467 |  |
| **960** | 　 | 　 | 　 | 　 | 　 |  | 1174 | 1760 |  |
| **2880** | 　 | 　 | 　 | 　 | 　 | 　 | 　 |  | 3520 |

## Topic 2-3: Channel raster

**Issue 2-3-1: R2D channel raster**

**Online Agreement:**

* Define 10kHz channel raster for both D2R and R2D.
	+ Note: channel raster for D2R will only be captured into BS spec 38.194
* No channel raster offset

## Topic 2-4: Others

**Issue 2-4-1: whether channel spacing is needed or not**

**Online Agreement:**

* No channel spacing.

**Issue 2-4-2: maximum number of devices allowed to communicate simultaneously with one A-IoT BS**

**Online Agreement:**

* No discussion is needed.

# Device RF requirements

## Topic 3-1: Transmit output power (For adhoc discusison)

**Issue 3-1-1: Transmit output power**

**Offline agreement:**

* Define requirements at the peak antenna gain direction.
* When input CW level is -27dBm, the backscatter loss<=10dB for OOK and <=6dB for BPSK (at peak direction)
* To be discussed: When input CW level is larger than [-12dBm], the backscatter power is larger than -25dBm
	+ The max CW input level in the test is [-10] dBm

Offline Agreement

* + When input CW level is-10dBm, the backscatter power is larger than -25dBm for OOK, and -21dBm for BPSK respectively.

## Topic 3-2: Modulation quality (For adhoc discussion)

**Issue 3-2-1: SFO requirement**

**Offline agreement:**

No explicitly define SFO requirement in RF spec. Define SFO value in D2R CBW bandwidth calculation equations if the equation is agreed to be included in the spec.

Moderator: Since it was agreed offline that equation will be captured in Annex. Check whether the above agreement is still OK, which means that define SFO value in the equation and captured in Annex.

Offline Agreement

on SFO，define equation and captured in Annex.

## Topic 3-3: Emission requirements (For adhoc discussion)

**Issue 3-3-1: SEM requirements**

Online Agreement:

Define flat SEM requirements, i.e. 10dBc, The RBW is 1SB

* + The carrier power includes the two sidebands centred at +/-SFS, but excludes the spectrum around the carrier frequency.

**Issue 3-3-1: spurious emission requirements (For Adhoc discussion)**

Offline agreement:

Table 3: Requirement for general spurious emissions limits

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | Maximum Level | Measurement bandwidth | NOTE |
| 30 MHz ≤ f < 1000 MHz | -36 dBm | 100 kHz |  |
| 1 GHz ≤ f < 5 GHz | -30 dBm | 1 MHz |  |
| 5 GHz ≤ f < 12.75 GHz | -30 dBm | 1 MHz | 1 |
| NOTE 1: Applies for Band for which the upper frequency edge of the UL Band is greater than 1 GHz and less than or equal to 2.55 GHz. |

* OOB boundary:
	+ For CBW<[1.4 or 1]MHz: max of 500kHz and 10 times NB where NB equals to D2R CBW
	+ For CBW>=[1.4 or 1]MHz: 7.5MHz assuming 3M CBW
* For testing:
	+ Only using limited DSB and SFS combination for testing with [ -10 dBm] CW input power.
		- SFS = 480kHz with [15kHz], 2SB transmission bandwidth need to be tested

Offline agreement:

* OOB boundary:
	+ For CBW<1.4 MHz: max of 500kHz and 10 times NB where NB equals to D2R CBW
	+ For CBW>=1.4 MHz: 7.5MHz assuming 3M CBW
* For testing:
	+ Only using limited DSB and SFS combination for testing with -5 dBm CW input power.
		- SFS = 480kHz with 15kHz, 2SB transmission bandwidth need to be tested

## Topic 3-4: Reference sensitivity

**Issue 3-4-1: Reference sensitivity**

**Online Agreement:**

* + EIS at peak antenna gain direction is -34dBm. Additional peak EIS levels can be added in the future if needed
* EIS spherical coverage requirement is defined as sensitivity over partial sphere, i.e. XdBm at Y solid angle range partial sphere . Y is suggested to be +-45 degree with respect to the bore sight direction (or UE declared direction), X is suggested to be 5.5dB worse than peak EIS.
	+ For testing
		- 90% success rate.
		- Use CFRA for REFSENS test procedure
		- Allow set time + SFO for the device response time.
		- Leave number of repeats to reach 90% success rate for the RAN5 to determine.
		- Further discuss if false alarm test can be considered in demod.
* FRC is listed as below (note: it does not mean UE should be tested for all specified FRC)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | SCS | 15 | 15 | 15 | 15 |
|  | PRB | 1 | 2 | 3 | 4 |
| SIP | Bit length | 8 | 8 | 8 | 8 |
|  | M\_SIP | 4 | 4 | 4 | 4 |
|  | OOK |  |  |  |  |
|  | OFDM | 2 | 2 | 2 | 2 |
| CAP | Bit length | 4 | 4 | 4 | 4 |
|  | M | 2 | 2 | 2 | 2 |
|  | OOK |  |  |  |  |
|  | OFDM | 2  | 2  | 2  | 2  |
| PRDCH | TBS | Depending on the size of the MAC PDU of A-IoT paging message indicating CFA |
|  | CRC | 16 | 16 | 16 | 16 |
|  | Line encoding |  |  |  |  |
|  | OOK |  |  |  |  |
|  | M | [2/6] | [2/6] | [2/6] | [2/6] |
| postamble | Bit length | 4 | 4 | 4 | 4 |
|  | M | 6 | 12 | 2 | 2 |
| chip number except for SIP, padding |  | 228 | 228 | 228 | 228 |
| Padding |  | 6 | 12 | 2 | 2 |

## Topic 3-5: Others

**Issue 3-5-1: Maximum input power**

**Online Agreement:**

Max input level is 30dB higher than peak EIS, detailed value is based on conclusion of min sensitivity.