**3GPP TSG-RAN WG4 Meeting # 102-e R4-210XXXX**

**Electronic Meeting, February 21 – March 3, 2022**

**Agenda item:** 10.13.3

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [102-e][310] NTN\_Solutions\_Part3

**Document for:** Information

# Introduction

*This E-mail thread will address the following issues for NTN BS and UE*

* + 1. Satellite Access Node RF requirements [NR\_NTN\_solutions-Core]
			1. TX requirements for radiated characteristics [NR\_NTN\_solutions-Core]
			2. RX requirements for radiated characteristics [NR\_NTN\_solutions-Core]
			3. Tx requirements for conducted characteristics [NR\_NTN\_solutions-Core]
			4. Rx requirements for conducted characteristics

The discussion including 2 main Topics

* Topic 1 will handle the remaining open issue for SAN type 1-H and SAN type 1-O as listed in section 1.2.1 & 1.2.2.
* Topic 2 will review the 38.108 TPs as listed in section 2.3

# Topic #1: Open issue for BS

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2203948**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203948.zip) | CATT | Figure 2-1 reference point for SAN type 1-O**Proposal 1: It is proposed to use RIB specified in figure 2-1 as the reference point for SAN type -1-O.** |
| [**R4-2205046**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205046.zip) | Ericsson | **Proposal1: Following Tx spurious limits shall be considered for NTN satellite access node:**

|  |  |  |  |
| --- | --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* | Notes |
| 9 kHz – 150 kHz |  | 1 kHz | Note 1 |
| 150 kHz – 30 MHz |  | 10 kHz  | Note 1 |
| 30 MHz – 1 GHz |  | 100 kHz | Note 1 |
| 1 GHz 12.75 GHz | -13dBm | 1 MHz | Note 1, Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz |  | 1 MHz | Note 1, Note 2, Note 3 |
| NOTE 1: *Measurement bandwidth*s as in ITU-R SM.329 [2], s4.1.NOTE 2: Upper frequency as in ITU-R SM.329 [2], s2.5 table 1.NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz. |

**Proposal2 : Specify additional operating band unwanted emissions limits for Band n24 (subclause .6.4.2.5.6 in TS 38.104) for satellite band n255 as well.** |
| [**R4-2205047**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205047.zip) | Ericsson | **Proposal1: Dynamic range requirement shall not be specified for GEO SAN.****Proposal2: Dynamic range requirement shall be specified for LEO1200 SAN considering an IoT level of 10-12 dBc.****Proposal3: Dynamic range requirement shall be specified for LEO600 SAN considering an IoT level of 15-18 dBc.****Proposal4: Specify In-channel selectivity requirements accordingly, assuming a required SINR of 9.5dB (similarly to NR).****Proposal5: Based on our further analysis of case 6, the SAN ACS should be specified with 40dBc value.** |
| [**R4-2205049**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205049.zip) | Ericsson | **Proposal1: Specify OTA REFSENS requirement using the same limits than for SAN 1-H, adjusted with SAN ΔOTAREFSENS.****Proposal2: Specify SAN OTA blocking requirement based on the SAN EISREFSENS and adjusted with the SAN ΔOTAREFSENS for the interferer.****Proposal3: Specify OTA In-channel selectivity using the same limits as 1-H ones but adjusted with the SAN ΔminSENS for both wanted signal and interferer values.** |
| [**R4-2205468**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205468.zip) | ZTE Corporation | **Proposal 1**: **to define the SAN OBUE requirement for GEO, LEO-600 and LEO-1200 as following:**Table 1. GEO UEM limit values

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz  |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 51dBm-24dBc-10\*log10(5\*10)+1dB margin=11dBm | 100 kHz  |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | 10dBm | 100 kHz  |

Table 2. LEO-1200 OBUE requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz  |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 53dBm-24dBc-10\*log10(5\*10)+1dB margin=13dBm | 100 kHz  |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | 12 | 100 kHz  |

Table 3. LEO-600 OBUE requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz  |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 47dBm-24dBc-10\*log10(5\*10)+1dB margin=7dBm | 100 kHz  |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | 6 | 100 kHz |

**Proposal 2: to define the spurious emission requirement for GEO, LEO-600 and LEO-1200 as following:**

|  |  |  |  |
| --- | --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* | Notes |
| 9 kHz – 150 kHz |  | 1 kHz | Note 1 |
| 150 kHz – 30 MHz |  | 10 kHz  | Note 1 |
| 30 MHz – 1 GHz |  | 100 kHz | Note 1 |
| 1 GHz 12.75 GHz | -13dBm | 1 MHz | Note 1, Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz |  | 1 MHz | Note 1, Note 2, Note 3 |
| NOTE 1: *Measurement bandwidth*s as in ITU-R SM.329 [2], s4.1.NOTE 2: Upper frequency as in ITU-R SM.329 [2], s2.5 table 1.NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz. |

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| [**R4-2205469**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205469.zip) | ZTE Corporation | **Proposal 1**: to define Rx dynamic range requirements with IoT level as18dBc for LEO600KM NTN BS;**Proposal 2**: to define Rx dynamic range requirements with IoT level as12dBc for LEO1200KM NTN BS;**Proposal 3:** to define Rx ICS level as 9dB for GEO, 21dB for LEO1200KM and 27dB for LEO600KM; |
| [**R4-2205977**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205977.zip) | Huawei, HiSilicon | **Proposal 1**: mirror the OTA EVM requirement value for 64QAM from the conducted 1-H requirement, i.e. 8 % as optional requirement subject to manufacturer declaration.**Proposal 2**: The OTA TX IMD requirement for SAN type 1-O is not necessary.  |
| [**R4-2205978**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205978.zip) | Huawei, HiSilicon | **Proposal 1**: reuse the *basic limit* terminology for the NTN SAN unwanted emissions requirements.**Proposal 2**: reuse Ncells terminology for the NTN SAN.**Proposal 3**: follow the existing AAS-based framework in TS 37.105/TS 38.104 for unwanted emissions scaling, with the existing exception that for any regulatory requirements the emission scaling may not be applicable.The above proposal would be more reasonable, especially considering that future NTN evolution is expected to look more into the MIMO feature for NTN. **Proposal 4**: align the AAS architecture definition and reuse the same TRXU units number of 8 as the minimum for the SAN type 1-O.**Proposal 5**: irrespective of the emissions scaling discussion, consideration of MIMO operation for NTN SAN shall be clarified in the Rel-17 NTN WID during the next TSG RAN meeting.**Proposal 6**: adjust the WF agreements from the previous meeting, to separate the emissions scaling discussion from the MIMO feature(s) consideration in NTN WI, e.g. “*WF:* *X scaling factors is not needed for OTA out-of-band emission and OTA transmitter spurious emission ~~since MIMO is not supported on SAN~~.*” |
| [**R4-2203949**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203949.zip) | CATT | **Proposal 1: OTA REFSENS requirement can be omitted if OTA sensitivity requirement is seen enough for SAN.****Proposal 2: It is proposed that OTA In-channel selectivity is specified using the same limits as SAN type 1-H ones but adjusted with the SAN ΔminSENS for both wanted signal and interfere values.****Proposal 3: OTA in-band blocking level is specified using the same limits as SAN type 1-H but adjusted with the SAN ΔminSENS  for both wanted signal and interfering signal.** |
| [**R4-2205980**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205980.zip) | Huawei, HiSilicon | **Proposal 1**: for SAN type 1-O, not to define OTA reference sensitivity level and rely on the declared sensitivity level (OTA sensitivity).**Proposal 2**: not to define Rx dynamic range requirements for NTN SAN type 1-O. |
| [**R4-2203950**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203950.zip) | CATT | **Proposal 1:** It’s proposed to adopt the SAN unwanted emission requirement as defined in Table 2.1-1. (withdrawn)**Proposal 2:**  It is proposed not to define intra-system intermodulation requirement in 38.108. |
| [**R4-2205982**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205982.zip) | Huawei, HiSilicon | **Proposal 1**: Reuse the EVM requirement value for 64QAM from NR BS specification, i.e. 8 % as optional requirement subject to manufacturer declaration.**Proposal 2**: introduce the intra-system transmitter intermodulation requirement for NTN SAN type 1-H. |
| [**R4-2203951**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203951.zip) | CATT | **Proposal 1:** It is proposed to define the IOT value as 12dB for LEO1200 and 15dB for LEO600 respectively.* Define single requirement for LEO1200 and LEO600 is also fine since the difference is small.

**Proposal 2:** It is proposed to define ICS as 16dB, 21dB and 24dB for GEO, LEO1200 and LEO 600 respectively.**Proposal 3:** It is proposed to define the in-blocking level as -64dBm for SAN |
| **R4-2205285** | Huawei | **Proposal 1: When RAN4 specify ACS requirements for NTN SAN, the actual adjacent channel interference from terrestrial network should be considered.****Proposal 2: For ACS requirements for NTN SAN, the interfering signal mean power can be -75dBm at the TAB connector for SAN type 1-H.**Table 1: SAN ACS requirement for type 1-H

|  |  |  |
| --- | --- | --- |
| *SAN channel bandwidth* of the lowest/*highest carrier* received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 5, 10, 15, 20 | PREFSENS + 6 dB | -75 |

**Proposal 3:** **ACS interferer frequency offset and the type of interfering signal for *SAN type 1-H* can be specified as below.**Table 3 ACS interferer frequency offset for SAN type 1-H

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Interfering signal centre frequency offset from the lower/upper *Base Station RF Bandwidth* edge or *sub-block* edge inside a *sub-block gap* (MHz) | Type of interfering signal |
| 5 | ±2.5025 |  |
| 10 | ±2.5075 | 5 MHz DFT-s-OFDM NR signal, |
| 15 | ±2.5125 | 15 kHz SCS, 25 RBs |
| 20 | ±2.5025 |  |

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| [**R4-2205985**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205985.zip) | Huawei, HiSilicon | **Proposal 1**: for LEO600/LEO1200: not to define Rx dynamic range requirements for NTN SAN type 1-H. |
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## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 Open issue for BS type 1-H

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1: EVM for 64QAM**

* Proposals
	+ Option 1: Reuse the EVM requirement value for 64QAM from NR BS specification, i.e. 8 % as optional requirement subject to manufacturer declaration.
	+ Option 2: Other, please specify
* Recommended WF

Option 1

**Issue 1-1-2: Operating band unwanted emissions**

* Proposals
* Option 1: To define the SAN OBUE requirement for GEO, LEO-600 and LEO-1200 as following:
* Table 1. GEO UEM limit values

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz  |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 51dBm-24dBc-10\*log10(5\*10)+1dB margin=11dBm | 100 kHz  |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | 10dBm | 100 kHz  |

* Table 2. LEO-1200 OBUE requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz  |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 53dBm-24dBc-10\*log10(5\*10)+1dB margin=13dBm | 100 kHz  |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | 12 | 100 kHz  |

* Table 3. LEO-600 OBUE requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 100 kHz  |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 47dBm-24dBc-10\*log10(5\*10)+1dB margin=7dBm | 100 kHz  |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | 6 | 100 kHz |

* + Option 2: Other, please specify
* Recommended WF

TBA

**Issue 1-1-3: Spurious emissions for SAN type 1-H**

* Proposals
	+ Option 1: Following Tx spurious limits shall be considered for NTN satellite access node

|  |  |  |  |
| --- | --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* | Notes |
| 9 kHz – 150 kHz |  | 1 kHz | Note 1 |
| 150 kHz – 30 MHz |  | 10 kHz  | Note 1 |
| 30 MHz – 1 GHz |  | 100 kHz | Note 1 |
| 1 GHz 12.75 GHz | -13dBm | 1 MHz | Note 1, Note 2 |
| 12.75 GHz – 5th harmonic of the upper frequency edge of the DL *operating band* in GHz |  | 1 MHz | Note 1, Note 2, Note 3 |
| NOTE 1: *Measurement bandwidth*s as in ITU-R SM.329 [2], s4.1.NOTE 2: Upper frequency as in ITU-R SM.329 [2], s2.5 table 1.NOTE 3: This spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz. |

* + Option 2: Other, please specify
* Recommended WF

TBA

**Issue 1-1-4: intra-system intermodulation requirements**

* Proposals
	+ Option 1: It is proposed not to define intra-system intermodulation requirement in 38.108.
	+ Option 2: introduce the intra-system transmitter intermodulation requirement for NTN SAN type 1-H.
* Recommended WF

TBA

**Issue 1-1-5: Dynamic range**

It has been agreed not to define dynamic range requirement for GEO and FFS for LEO1200 and LEO600.

* Proposals
	+ Option 1: It is proposed to define the IOT value as 12dB for LEO1200 and 15dB for LEO600 respectively.
	+ Option 2: It is proposed to define the IOT value as 12dB for LEO1200 and 18dB for LEO 600
	+ Option 3: it is proposed to define the IOT value as 10-12 dB for LEO1200 and 15-18dB for LEO600.
	+ Option 4: it is proposed to define single IOT requirement for LEO1200 and LEO600, e.g. 15dB.
	+ Option 5: for LEO600/LEO1200: not to define Rx dynamic range requirements for NTN SAN type 1-H.
	+ Other, please specify.
* Recommended WF

TBA

**Issue 1-1-6: ICS**

* Proposals
	+ Option 1: It is proposed to define ICS as 16dB, 21dB and 24dB for GEO, LEO1200 and LEO 600 respectively.
		- IOT for GEO=7dB according to simulations.
	+ Option 2: To define Rx ICS level as 9dB for GEO, 21dB for LEO1200KM and 27dB for LEO600KM;
		- IOT for GEO=0dB
	+ Option 3: Specify In-channel selectivity requirements according to IOT for dynamic range, assuming a required SINR of 9.5dB (similarly to NR).
	+ Option 4: Not to define Rx dynamic range requirements for LEO600/LEO1200.
* Recommended WF

TBA

**Issue 1-1-7: ACS**

* Proposals
	+ Option 1: For ACS requirements for NTN SAN, the interfering signal mean power can be -75dBm at the TAB connector for SAN type 1-H.
* Table 1: SAN ACS requirement for type 1-H

|  |  |  |
| --- | --- | --- |
| *SAN channel bandwidth* of the lowest/*highest carrier* received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 5, 10, 15, 20 | PREFSENS + 6 dB | -75 |

* + Option 2: Other, please specify
* Recommended WF

TBA

**Issue 1-1-8: in-band blocking**

* Proposals
	+ Option 1: it is proposed to specify the in-band blocking as -64dBm for SAN
	+ Option 2: Other, please specify
* Recommended WF

TBA

### Sub-topic 1-2 Open issue for BS type 1-O

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-2-1: Reference point for SAN type 1-O**

* Proposals
	+ Option 1: it is proposed to agree the following reference point for SAN type 1-O



* + Option 2: other, please specify.
* Recommended WF

 TBA

**Issue 1-2-2: EVM requirement for BS type 1-O**

* Proposals
	+ Option 1: Mirror the OTA EVM requirement value for 64QAM from the conducted 1-H requirement, i.e. 8 % as optional requirement subject to manufacturer declaration.
	+ Option 2: other, please specify
* Recommended WF

 TBA

**Issue 1-2-3: “basic limit” terminology**

* Proposals
	+ Option 1: Reuse the basic limit terminology for the NTN SAN unwanted emissions requirements.
	+ Option 2: Do not use the basic limit terminology
* Recommended WF

 TBA

**Issue 1-2-4: “**Ncells**” terminology for OTA UEM**

* Proposals
	+ Option 1: Reuse the Ncells terminology for the NTN SAN unwanted emissions requirements.
	+ Option 2: Do not use the Ncells terminology
* Recommended WF

 TBA

**Issue 1-2-5: unwanted emissions scaling**

* Proposals
	+ Option 1: stick to the previous agreement in R4-2203034. X scaling is not used for SAN UEM.
	+ Option 2: follow the existing AAS-based framework in TS 37.105/TS 38.104 for unwanted emissions scaling, with the existing exception that for any regulatory requirements the emission scaling may not be applicable.
* Recommended WF

 TBA

**Issue 1-2-6: number of TRXU units**

* Proposals
	+ Option 1: align the AAS architecture definition and reuse the same TRXU units number of 8 as the minimum for the SAN type 1-O.
	+ Option 2: other, please specify
* Recommended WF

 TBA

**Issue 1-2-7: MIMO operation for SAN**

* Proposals
	+ Option 1: Stick to the previous agreement that MIMO is not supported in Rel-17.
	+ Option 2: irrespective of the emissions scaling discussion, consideration of MIMO operation for NTN SAN shall be clarified in the Rel-17 NTN WID during the next TSG RAN meeting.
* Recommended WF

 TBA

**Issue 1-2-8: X scaling for OTA UEM and OTA spurious emissions**

* Proposals
	+ Option 1: Stick to the previous agreement that X scaling is not needed for SAN.
	+ Option 2: adjust the WF agreements from the previous meeting, to separate the emissions scaling discussion from the MIMO feature(s) consideration in NTN WI, e.g. “WF: X scaling factors is not needed for OTA out-of-band emission and OTA transmitter spurious emission since MIMO is not supported on SAN.”
* Recommended WF

 TBA

**Issue 1-2-9: intra-system OTA IMD requirement**

* Proposals
	+ Option 1: Not to define intra-system OTA IMD requirement
	+ Option 2: other, please specify
* Recommended WF

 TBA

**Issue 1-2-10: OTA reference sensitivity level**

* Proposals
	+ Option 1: Not to define OTA reference sensitivity level and rely on the declared sensitivity level (OTA sensitivity).
	+ Option 2: Specify OTA REFSENS requirement using the same limits than for SAN 1-H, adjusted with SAN ΔOTAREFSENS.
* Recommended WF

 TBA

**Issue 1-2-11: OTA dynamic range**

* Proposals
	+ Option 1: Specify OTA dynamic using the same limits as 1-H ones but adjusted with the SAN ΔminSENS for both wanted signal and interferer values.
	+ Option 2: not to define Rx dynamic range requirements for SAN type 1-O.
* Recommended WF

 TBA

**Issue 1-2-12: OTA ICS**

* Proposals
	+ Option 1: It is proposed that OTA In-channel selectivity is specified using the same limits as SAN type 1-H ones but adjusted with the SAN ΔminSENS for both wanted signal and interfere values.
	+ Option 2: Not to define OTA ICS requirement for SAN type 1-O
* Recommended WF

 TBA

**Issue 1-2-13: in-band blocking**

* + Option 1: OTA in-band blocking level is specified using the same limits as SAN type 1-H but adjusted with the SAN ΔminSENS for both wanted signal and interfering signal.
	+ Option 2: other, please specify.

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 1-1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | **Issue 1-1-1: EVM for 64QAM**Option 1. **Issue 1-1-2: Operating band unwanted emissions**checking**Issue 1-1-3: Spurious emissions for SAN type 1-H**Option 1**Issue 1-1-4: intra-system intermodulation requirements**Option 1. This is an implementation issue and no requirement is needed since the OBUE and ACLR needs to be satisfied anyway.**Issue 1-1-5: Dynamic range**Option 1/2/3/4**Issue 1-1-6: ICS**Option 1. Although we don’t define dynamic range requirement for GEO. The IOT for GEO needs to be considered when specifying ICS for GEO.**Issue 1-1-7: ACS**Pending the decision for SAN ACS.**Issue 1-1-8: in-band blocking**Option 1. |
| Ericsson | Issue 1-1-1: EVM for 64QAM Option 1Issue 1-1-2: Operating band unwanted emissions If we go for Option 1, we will have then to define 3 SAN classes. In all tables, the last raw (<10MHz) should be aligned with spurious limit (-13dBm/1MHz).Issue 1-1-3: Spurious emissions for SAN type 1-H Option 1.Issue 1-1-4: intra-system intermodulation requirements We are not against option 2 but the corresponding proposal is to define requirements based on manufacturer declaration, which would not make much sense. Option 1 for the time being then.Issue 1-1-5: Dynamic range Options 1, 2 or 3 are acceptable based on the simulations from companies. Option 4 would also be acceptable if all Tx and Rx requirements are common for LEO600 and LEO1200. Still, 15 dB might be too high value for LEO1200..Issue 1-1-6: ICS Options 1, 2 and 3 are actually aligned, they are depending on the IoT level we would agree for dynamic range. We think ICS requirement should be specified.Issue 1-1-7: ACS Option 2, the provided analysis is to determine the blocking level and not the ACS interferer level which is calculated based on the ACS value and the SAN noise floor, see R4-2205056 (-57Bm for Geo and -60dBm for LEOs).Issue 1-1-8: in-band blocking Haven’t we already agreed to not specify in-band blocking requirement? The interfer would be very low anyway, even lower than -64dBm… |
| ZTE | Issue 1-1-1: EVM for 64QAM Support Option 1Issue 1-1-2: Operating band unwanted emissions For the last row to align with spurious emissions, not sure whether it’s achievable to have such large attenuation within in-band emission, if not, maybe we would just go with option 1 with in-band spurious emission is much higher than out of band spurious emission, then attenuation between in-band emission and out of band emission is achieved by front-end filters similar as in-band emission and Cat B spurious emission requirement.Issue 1-1-3: Spurious emissions for SAN type 1-H Support Option 1 to avoid the multiple spurious requirement for different class;Issue 1-1-4: intra-system intermodulation requirementsNo strong opinions on that, maybe it’s okay for option 2.Issue 1-1-5: Dynamic range Fine with option 1/2/3, our first preference is till option 2.  Issue 1-1-6: ICS Similar comments as mentioned by Ericsson, we could use the IoT levels to derive the ICS requirement;Issue 1-1-7: ACS Interfering signal for ACS requirement is not derived by simulation results instead of derived by ACS requirements;Issue 1-1-8: in-band blockingUsually in-band blocking requirement is 8/9db higher than ACS requirement. |
| Huawei | **Issue 1-1-1: EVM for 64QAM:** Option 1**Issue 1-1-2: Operating band unwanted emissions:** related to SAN classes conclusion in [308]. Let’s avoid discussing it twice. OBUE details require more time to check.**Issue 1-1-3: Spurious emissions for SAN type 1-H:** **Issue 1-1-4: intra-system intermodulation requirements:** this proposal was formulated as no good motivation was found to simply ignore intra-system IMD. @CATT: if this would be considered as implementation issue, there would be no such requirement for NR BS either. If we follow Option 1, we need to capture technical justification in the TR, why SAN case is different to the NR BS.**Issue 1-1-5: Dynamic range:** Option 5 as first preference, but seems that all other companies think this requirement is needed.  |
| THALES | **Issue 1-1-1: EVM for 64QAM**Option 1. EVM=8% for 64 QAM could be possible for some payload configurations but not guaranteed for all cases.**Issue 1-1-2: Operating band unwanted emissions**A first analysis shows that values from Option 1 are stringent. Need further analysis. Based on 2 class definition, 4kHz measurement bandwidth, SAB BW and Power, we further define the SAN OBUE requirement for GEO class and LEO class as following :* Table 1. GEO UEM limit values

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 4kHz |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 51dBm-[16dB]-10\*log(20000/4)+3dB\_margin=1dBmGEO ACLR=[16 dB] TBC | 4kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | Not applicable for B<100 MHz | 4kHz |

* Table 2. LEO OBUE requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1, 2) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 5 MHz | 0.05 MHz ≤ f\_offset < 5.05 MHz |  | 4kHz |
| 5 MHz ≤ Δf <min(10 MHz, Δfmax) | 5.05 MHz ≤ f\_offset <min(10.05 MHz, f\_offsetmax) | 53dBm-[24dB]-10\*log(20000/4)+3dB\_margin=-5dBmLEO ACLR=[24 dB] TBC | 4kHz |
| 10 MHz ≤ Δf ≤ Δfmax | 10.05 MHz ≤ f\_offset < f\_offsetmax | Not applicable for B<100 MHz | 4kHz |

We also propose a new option for Issue 1-1-2.**Issue 1-1-3: Spurious emissions for SAN type 1-H**Option 2, for Satellites in S-Band and L-band, following frequency range should be applied

|  |  |
| --- | --- |
| Fundamental frequency range | Frequency range for measurements |
|  | Lower limit | Upper limit(The test should include the entire harmonicband and not be truncated at the preciseupper frequency limit stated) |
| 600 MHz-5.2 GHz | 30 MHz | 5th harmonic |

The lower limit of 30 MHz shall be replaced as per ITU-R SM.329-12: Systems having an integral antenna incorporating a waveguide section, or with an antenna connection in such form, and of unperturbed length equal to at least twice the cut-off wavelength, do not require spurious domain emission measurements below 0.7 times the waveguide cut-off frequency.Tx spurious limit value of -13 dBm shall not be applied within the transmit L-Band and S-Band.There seems to be also some misinterpretation with respect to ITU-R SM.329-12, for satellite case.**Issue 1-1-4: intra-system intermodulation requirements**Option 1. **Issue 1-1-5: Dynamic range**Under analysis. Depending where the satellite is on the orbit (elevation angle), the SNR could be different.We can also consider Option 5 for simplification purposes.**Issue 1-1-6: ICS**Under analysis. **Issue 1-1-7: ACS**Currently 38 dB for LEO and GEO rural and urban (more precisely urban mixture). Previously (RAN4#101-bis-e) it was 35 dB for GEO and 38 dB for LEO but we decided to consider worst case, again 38 dBs. For the interfering signal mean power we propose -57 dBm.See R4-2205922:Table 7.4.1.2-1: SAN ACS requirement

|  |  |  |
| --- | --- | --- |
| *SAN channel bandwidth* of the lowest/*highest carrier* received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) |
| 5, 10, 15, 20 (Note 1) | PREFSENS + 6 dB | -57 |
| NOTE 1: The SCS for the lowest/highest carrier received is the lowest SCS supported by the SAN for that bandwidth.NOTE 2: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *SAN channel bandwidth*. |

The wanted signal and interfering signal power level are calculated in the following way in FR1:1. Wanted signal power level = REFSENS + 6 dB
2. Interfering signal power level =

= SAN noise floor + ACS + 4.7dB = ‑174 dBm/Hz+10\*log10(BW) + NF + ACS + 4.7 dBWhere:- BW is wanted signal bandwidth in Hz, e.g. 25 PRB for 5 MHz SCS 15 kHz;- NF is noise figure which is agreed as 7.4 dB for GEO, 4.3 dB for LEO@600, 4.3 dB for LEO@1200;- SAN ACS is agreed as 38 dBc (more precisely according to coexistence Scenario 6, it has been noticed that the required SAN ACS is 35 dBc for GEO and 38 dBc for LEO, with the worst case SAN currently being dBc ACS);- 4.7 dB is calculated from 10log10(10^(6/10)-1).If the equation considers GEO with 35 dB ACS with NF of 7.4 dB, for 5 MHz signal bandwidth (as for TS 38.104), the interfering signal mean power level is -174+10\*log10(**5\***10^6)+7.4+35+4.7=**-54dBm.** If the equation considers LEO with 38 dB ACS with NF of 4.3 dB, for 5 MHz signal bandwidth (as for TS 38.104), the interfering signal mean power level is -174+10\*log10(**5\***10^6)+4.3+38+4.7=**-54dBm.** One can further notice that the same interfering signal mean power result is obtained for both GEO and LEO, justifying no need for further SAN (satellite) class differentiation.If the equation considers the worst case of 38 dB ACS, with NF of 7.4 dB, for 5 MHz signal bandwidth (as for TS 38.104), the interfering signal mean power level is -174+10\*log10(**5\***10^6)+7.4+38+4.7=**-57dBm,** according to the interfering signal mean power value from Table 7.4.1.2-1**.**Table 7.4.1.2-2: SAN ACS interferer frequency offset values

|  |  |  |
| --- | --- | --- |
| *SAN channel bandwidth* of the *lowest/highest carrier* received (MHz) | Interfering signal centre frequency offset from the lower/upper *Base Station RF Bandwidth edge* or *sub-block* edge inside a *sub-block gap* (MHz) | Type of interfering signal |
| 5 | ±2.5025 |  |
| 10 | ±2.5075 | 5 MHz OFDM NR signal |
| 15 | ±2.5125 | 15 kHz SCS, 25 RBs |
| 20 | ±2.5025 |  |

**Issue 1-1-8: in-band blocking**Option 2: If defined, this requirement should be defined as a function of the SAN class either GEO or LEO. We don’t agree with -64dBm (seems too high for a satellite input level). Option 3: We also propose to remove this requirement, it does not seem necessary. We agree with Ericsson.**Currently there is no In-band blocker considered for SAN.** |
| Inmarsat | **Issue 1-1-1:**Option 1**Issue 1-1-2**Option 2 – We need more time to check/discuss, ITU-R requirements for satellite nodes (“space stations” in ITU-R parlance) are different vs terrestrial, for example, as per ITU-R SM.1541-6, measurement bandwidth for out-of-band emissions is 4 kHz for space stations.We encourage looking carefully at SM.1541-6 and SM-1540-0. **Issue 1-1-3**Similar comment as above, please refer to specific satellite requirements as per ITU-R radio regulations, we note that also for spurious emissions, the measurement bandwidth for satellite is 4 kHz. This can be found in ITU-RR Appendix 3, which I believe comes from SM.329. An example is also provided:“Example 2 A space service transmitter with any value of necessary bandwidth must meet a spurious domain emission attenuation of 43 + 10 log (P), or 60 dBc, whichever is less stringent. To measure spurious domain emissions at any frequency, Note 10 to Table I indicates using a reference bandwidth of 4 kHz. With a measured total mean power of 20 W: ± Attenuation relative to total mean power = 43 + 10 log (20) = 56 dBc. ± The 56 dBc value is less stringent than the 60 dBc limit, so the 56 dBc value is used. ± Therefore: Spurious domain emissions must not exceed 56 dBc in a 4 kHz reference bandwidth, or converting to an absolute level, they must not exceed 13 dBW í 56 dBc = í dBW in a 4 kHz reference bandwidth. (WRC-03)” |
| Nokia | Issue 1-1-1: EVM for 64QAMOption 1Issue 1-1-2: Operating band unwanted emissionsWe should align to only 2 SAN types and use the most stringent LEO maskIssue 1-1-3: Spurious emissions for SAN type 1-HTo be updated based on GTWIssue 1-1-4: intra-system intermodulation requirementsOption 1Issue 1-1-5: Dynamic rangeFine with 15 dB for LEO.Issue 1-1-6: ICSTo be updated based on GTWIssue 1-1-7: ACSAgree with the Ericsson proposal of-57Bm for GEO and -60dBm for LEO.Issue 1-1-8: in-band blockingNot sure if this is needed. |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | **Issue 1-2-1: Reference point for SAN type 1-O**Option 1.**Issue 1-2-2: EVM requirement for BS type 1-O**Option 1**Issue 1-2-3: “basic limit” terminology**We have agreed not to use the basic limits concept in previous meeting. **Issue 1-2-4: “**Ncells**” terminology for OTA UEM**I have a clarification question, is Ncell only used for scaling? **Issue 1-2-5: unwanted emissions scaling**We prefer Option 1 unless it is identified necessary to do scaling for SAN.**Issue 1-2-6: number of TRXU units**We need views from satellite industry whether 8 is the typical implementation.**Issue 1-2-7: MIMO operation for SAN**Option 1**Issue 1-2-9: intra-system OTA IMD requirement**Option 1.**Issue 1-2-10: OTA reference sensitivity level**No strong opinion. Maybe option 1 works.**Issue 1-2-11: OTA dynamic range**Option1 is fine for us.**Issue 1-2-12: OTA ICS**Option1 is fine for us.**Issue 1-2-13: in-band blocking**Option1 is fine for us. |
| Ericsson | Issue 1-2-1: Reference point for SAN type 1-O In the proposed figure, the RIB should be outside the SAN (it’s an external interface to SAN).Issue 1-2-2: EVM requirement for BS type 1-O  Option 1 is okIssue 1-2-3: “basic limit” terminology  The “basic limit” is meaningful if we have some scaling consideration, but we don’t think scaling is relevant here for NTN… We could still keep “basic limit” if companies have strong preference.Issue 1-2-4: “Ncells” terminology for OTA UEM Option 2. This is somehow link to the scaling question. We don’t think we would need to define Ncells if we don’t have scaling and the output power is manufacturer declaration.Issue 1-2-5: unwanted emissions scaling Option 1, we don’t think scaling is relevant here. Issue 1-2-6: number of TRXU units Option 2, similar to Ncells, we should need to introduced TRXU definition.Issue 1-2-7: MIMO operation for SAN Option 1, this was common understanding, agreed in last meeting.Issue 1-2-8: X scaling for OTA UEM and OTA spurious emissions Option 1, no need to come back on previous agreement. Still, we could update the exact wording of the agreement.e Most likley option 1, for the rationale given in issue 1-14Issue 1-2-10: OTA reference sensitivity level Option 2 (linked to dynamic range discussion).Issue 1-2-11: OTA dynamic range Option 1: as per the provided simulations from different companies, dynamic range requirement makes sense.Issue 1-2-12: OTA ICS Option 1.Issue 1-2-13: in-band blocking  Option 1 was our proposal and is not wrong, but in-band blocking requirement would not be relevant for NTN due to the very low level of interferer (coex simulations). |
| ZTE | Issue 1-2-1: Reference point for SAN type 1-O Fine with option 1Issue 1-2-2: EVM requirement for BS type 1-O  Fine with option 1Issue 1-2-3: “basic limit” terminology  Similar comment as Ericsson, basic limit didn’t provide more information..Issue 1-2-4: “Ncells” terminology for OTA UEM Support Option 2 since scaling factor is not needed.Issue 1-2-5: unwanted emissions scaling Option 1,Issue 1-2-6: number of TRXU units Option 2 similar as NcellsIssue 1-2-7: MIMO operation for SAN Option 1Issue 1-2-8: X scaling for OTA UEM and OTA spurious emissions Option 1Issue 1-2-9: intra-system OTA IMD requirement Not needed even for BS type 1-O, intra-system IMD requirement is also not needed. Issue 1-2-10: OTA reference sensitivity level Option 2 Issue 1-2-11: OTA dynamic range Option 1: similar as conducted part.Issue 1-2-12: OTA ICS Option 1.Issue 1-2-13: in-band blocking  Option 1 . |
| Huawei | Issue 1-2-1: Reference point for SAN type 1-O: Agree with Ericsson that RIB is an “external interface”Issue 1-2-2: EVM requirement for BS type 1-O: Option 1Issue 1-2-3: “basic limit” terminology: Option 1 preferred due to the AAS framework consistency purposes. This is related to the confusing issue of the MIMO consideration (note: WID does NOT exclude MIMO at this stage). If at some point in time we “confirm that MIMO is used for SAN”, then how do we justify that there is no basic limit used? There was no agreement last meeting on basic limit (there was agreement on the related emissions scaling).Issue 1-2-4: “Ncells” terminology for OTA UEM: we are using AAS framework for SAN, but there is no good justification how to “avoid” using Ncells, emissions scaling etc. we cannot say that “we don’t use Ncells because there is no scaling, because there is no MIMO”. Ncells for TN was introduced to reflect the possibility of increased emissions due to different TRX groups serving different geographical areas (cell splitting). Due to lack of good technical justification, we were proposing to simply stick to the existing AAS framework (while we still have issue how the MIMO can be excluded from SAN considerations).In case we follow “no Ncells”, then we need to capture technical justification in TR. Issue 1-2-5: unwanted emissions scaling: we are not trying to revert the previous agreement, but we cannot say “there is no scaling as there is no MIMO”. “no scaling” agreement needs to be adjusted to remove the no-MIMO motivation, which is simply incorrect. Issue 1-2-6: number of TRXU units: this proposal was based on the AAS framework. It is expected that there will be much higher number of TRX in SAN 1-O anyway.Issue 1-2-7: MIMO operation for SAN: I am aware of previous discussion. Can anyone explain on which basis we exclude MIMO and how this restriction will be reflected in RAN1/2 specs? MIMO argument shall be separated from the “no scaling” agreement. Issue 1-2-8: see 1-2-7. MIMO argument shall be separated from the “no scaling” agreement. Issue 1-2-9: intra-system OTA IMD requirement: option 1Issue 1-2-10: OTA reference sensitivity level: option 1Issue 1-2-11: OTA dynamic range: option 2, but alignment with 1-H needed. |
| THALES | **Issue 1-2-1: Reference point for SAN type 1-O**Option 1. We agree with Option 1 to define the RIB as depicted in the Figure. Nevertheless, it should be added that the RIB shall be located in the antenna far field region.**Issue 1-2-2: EVM requirement for BS type 1-O**Option 1**Issue 1-2-3: “basic limit” terminology**We can keep the terminology, but the unwanted emissions need to be adapted for SAN/satellite purposes.**Issue 1-2-4: “**Ncells**” terminology for OTA UEM**Option 1 (but cell could be replaced by “beam” or “spot” )**Issue 1-2-5: unwanted emissions scaling**Option 1.**Issue 1-2-6: number of TRXU units**Please see the contribution R4-2205673. We removed “8” from the text because 8 is not the typical implementation. Agree with Huawei.**Issue 1-2-7: MIMO operation for SAN**Option 1**Issue 1-2-8: X scaling for OTA UEM and OTA spurious emissions**We agree with Option 1**Issue 1-2-9: intra-system OTA IMD requirement**Option 1.**Issue 1-2-10: OTA reference sensitivity level**It can be Option 2 (preferred).**Issue 1-2-11: OTA dynamic range**Can be Option 2, and if not, Option 1. Of course, we need to align with 1-H.**Issue 1-2-12: OTA ICS**Option 2**Issue 1-2-13: in-band blocking**Option 1: If required, this requirement should be defined as a function of the SAN class either GEO or LEO. We don’t agree with -64dBm (seems too high for a satellite input level) adjusted with ΔminSENS. There is no in-band blocker defined for SAN. Therefore, we prefer:**Agree with Option 2:** Do not consider any in-band blocker for SAN. |
| Inmarsat | **Issue 1-2-1: Reference point for SAN type 1-O** Same as noted by Ericsson, however, it seems this figure is correct in the pCR?**Issue 1-2-2: EVM requirement for BS type 1-O**  Option 1**Issue 1-2-3: “basic limit” terminology**  Same comment as previous sub-topic, we need to be careful here and make sure this aligns with regulations, particularly “space stations” related regulations in SM.329, SM.1540 and SM.1541Issue 1-2-4: “Ncells” terminology for OTA UEM No strong view for now.Issue 1-2-5: unwanted emissions scaling Scaling may not be relevant since different assumptions apply for NTN for calculating unwanted emissions on OoB Issue 1-2-6: number of TRXU units Option 2 Not sure if this makes sense to apply to an NTN payload. Issue 1-2-7: MIMO operation for SAN Option 1 is okIssue 1-2-8: X scaling for OTA UEM and OTA spurious emissions No strong view for nowIssue 1-2-10: OTA reference sensitivity level Probably Option 2, but awaiting for SAN classes conclusion and other aspectsIssue 1-2-11: OTA dynamic range Option 1 – SAN classes may apply?Issue 1-2-12: OTA ICS Need more time to understandIssue 1-2-13: in-band blocking  No position for now |
| Nokia | Issue 1-2-1: Reference point for SAN type 1-OAgree with the comment from EricssonIssue 1-2-2: EVM requirement for BS type 1-O Option 1Issue 1-2-3: “basic limit” terminology To be updated based on GTWIssue 1-2-4: “Ncells” terminology for OTA UEMTo be updated based on GTWIssue 1-2-5: unwanted emissions scalingTo be updated based on GTWIssue 1-2-6: number of TRXU unitsTo be updated based on GTWIssue 1-2-7: MIMO operation for SANOption 1Issue 1-2-8: X scaling for OTA UEM and OTA spurious emissionsOption 1Issue 1-2-9: intra-system OTA IMD requirementOption 1Issue 1-2-10: OTA reference sensitivity levelOption 2Issue 1-2-11: OTA dynamic rangeOption 1Issue 1-2-12: OTA ICSOption 1Issue 1-2-13: in-band blocking Option 1 |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Topic #2: 38.108 spec drafting and TP review

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Proposals / Observations** | **Company** |
| **TPs for general part** |
| [**R4-2205054**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205054.zip) | Ericsson  | pCR to TS 38.108 - Scope and general |
| [**R4-2205976**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205976.zip) | Huawei, HiSilicon | TP to TS 38.108: section 4 |
| [**R4-2206121**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206121.zip) | Huawei, HiSilicon | TP to TS 38.108: section 3 |
| **R4-2203956** | CATT | TP for 38.108: clause 9.3 OTA Satellite Access Node output power |
| [**R4-2205474**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205474.zip) | ZTE Corporation | TP for TS 38.108 Annex B |
| [**R4-2205987**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205987.zip) | Huawei, HiSilicon | TP to TS 38.108: annex A (FRC) |
| TPs for Tx part of BS type 1-O |
| [**R4-2203957**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203957.zip) | CATT | TP for 38.108: clause 9.7 OTA unwanted emissions |
| [**R4-2205057**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205057.zip) | Ericsson | pCR to TS 38.108 -Radiated Tx general and transmit power |
| [**R4-2205477**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205477.zip) | ZTE Corporation | TP for TS 38.108 OTA output power dynamics(9.4) |
| [**R4-2205848**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205848.zip) | THALES | Draft text proposal for Clause 7.3.4.7.3 OTA ACLR in TR 38.863 |
| [**R4-2205878**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205878.zip) | THALES | Draft text proposal for Clause 9.3 OTA Satellite Access Node output power - TS 38.108 |
| [**R4-2205880**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205880.zip) | THALES | Draft text proposal for Clause 9.6 OTA transmitted signal quality - TS 38.108 |
| [**R4-2205886**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205886.zip) | THALES | Draft text proposal for Clause 9.7.3 OTA Adjacent Channel Leakage Power Ratio (ACLR) - TS 38.108 |
| [**R4-2205979**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205979.zip) | Huawei, HiSilicon | TP to TS 38.108: 9.5 (OTA Tx ON/OFF), 9.6 (OTA TX signal quality) and 9.8 (OTA Tx IMD) |
| TPs for Rx part of BS type 1-O |
| [**R4-2203958**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203958.zip) | CATT | TP for 38.108: clause 10.5 OTA in-band selectivity and blocking |
| [**R4-2205058**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205058.zip) | Ericsson | pCR to TS 38.108 - Radiated Rx general and sensitivity |
| [**R4-2205478**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205478.zip) | ZTE Corporation | TP for TS 38.108 OTA Rx requirements(10.3, 10.4,10.6 and 10.9) |
| [**R4-2205851**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205851.zip) | THALES | Draft text proposal for Clause 7.3.5.6 OTA Out-of-band blocking in TR 38.863 |
| [**R4-2205897**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205897.zip) | THALES | Draft text proposal for Clause 10.5 OTA in-band selectivity (ACS) and OTA in-band blocking - TS 38.108 |
| [**R4-2205899**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205899.zip) | THALES | Draft text proposal for Clause 10.6 OTA out-of-band blocking - TS 38.108 |
| [**R4-2205981**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205981.zip) | Huawei, HiSilicon | TP to TS 38.108: section 10.7 (OTA Rx spur) and 10.8 (OTA Rx IMD) |
| TPs for Tx part of BS type 1-H |
| [**R4-2203954**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203954.zip) | CATT | TP for 38.108: clause 6.6.1&6.6.2&6.6.3 unwanted emissions |
| [**R4-2205055**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205055.zip) | Ericsson | pCR to TS 38.108 - Transmitter spurious emissions |
| [**R4-2205445**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205445.zip) | HUGHES Network Systems Ltd | TP to TS 38.108 on 6.0 Conducted transmitter characteristics |
| [**R4-2205479**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205479.zip) | ZTE Corporation | TP for TS 38.108: Output power dynamics (6.3) |
| [**R4-2205813**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205813.zip) | THALES | Draft text proposal for Clause 6.1 and 6.2 Satellite Access Node output power - TS 38.108 |
| [**R4-2205823**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205823.zip) | THALES | Draft text proposal for Clause 6.5.2 Modulation quality - TS 38.108 |
| [**R4-2205825**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205825.zip) | THALES | Draft text proposal for Clause 6.6.3 Adjacent Channel Leakage Power Ratio - TS 38.108 |
| [**R4-2205827**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205827.zip) | THALES | Draft text proposal for Clause 7.3.2.2.4.1 ACLR in TR 38.863 |
| [**R4-2205983**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205983.zip) | Huawei, HiSilicon | TP to TS 38.108: section 6.4 (Tx ON/OFF) and 6.5 (TX signal quality) |
| [**R4-2205984**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205984.zip) | Huawei, HiSilicon | TP to TS 38.108: section 6.7 (Tx IMD) |
| [**R4-2206117**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206117.zip) | Inmarsat | Draft TP for TS 38.108 Section 6.6.4 Operating band unwanted emissions |
| TPs for Rx part of BS type 1-H |
| [**R4-2203955**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203955.zip) | CATT | TP for 38.108: clause 7.1&7.2 on Rx refsens sensitivity |
| [**R4-2205056**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205056.zip) | Ericsson | pCR to TS 38.108 - In-band selectivity and blocking |
| [**R4-2205475**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205475.zip) | ZTE Corporation | TP for TS 38.108 Dynamic range(7.3) and In channel selectivity(7.8) |
| [**R4-2205847**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205847.zip) | THALES | Draft text proposal for Clause 7.3.3.2.4 Out-of-band blocking in TR 38.863 |
| [**R4-2205864**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205864.zip) | THALES | Draft text proposal for Clause 7.4.1 Adjacent Channel Selectivity (ACS) and Clause 7.4.2 In-band blocking - TS 38.108 |
| [**R4-2205866**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205866.zip) | THALES | Draft text proposal for Clause 7.5 Out-of-band blocking - TS 38.108 |
| [**R4-2205922**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205922.zip) | THALES | Draft text proposal for Clauses 7.3.3.2.3.1 Adjacent Channel Selectivity (ACS) and 7.3.3.2.3.2 In-band blocking in TR 38.863 |
| [**R4-2205986**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205986.zip) | Huawei, HiSilicon | TP to TS 38.108: section 7.6 (Rx spur) and section 7.7 (Rx IMD) |
|  |  |  |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*This section only focus on specification drafts review.*

*It is noted that multiple TPs are presented for some sections, some of which are not aligned with the work split agreed in R4-2203080. To improve work efficiency and reducing work load, companies are encouraged to present comments with focus on those TPs that is aligned with the agreed work split.*

#### TPs for General Part

|  |  |  |
| --- | --- | --- |
| **CR/TP number** | **Align with work split?** | **Comments collection** |
| [**R4-2205054**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205054.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205976**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205976.zip) | No.Only section 4 and 4.1 need to be reviewed. | Ericsson: ok with 4 and 4.1 |
|  |
|  |
| [**R4-2206121**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206121.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205474**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205474.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205987**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205987.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| **R4-2203956** | Yes | Company A |
| Company B |
| Ericsson: see commented file |

#### TPs for Tx RF part of BS type 1-H

|  |  |  |
| --- | --- | --- |
| **CR/TP number** | **Align with work split?** | **Comments collection** |
| [**R4-2203954**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203954.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205055**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205055.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205445**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205445.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205479**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205479.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205813**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205813.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205823**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205823.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205825**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205825.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205827**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205827.zip) | No(Contribution different from leading company) | Company A |
| Company B |
| THALES: please consider the contribution for the justification in TR 38.863 of not using the absolute basic limit value for the SAN ACLR (2nd methodology) |
| [**R4-2205983**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205983.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205984**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205984.zip) | Yes | Company A |
| Company B |
| Ericsson: pending on Ran4 decision for this requirement |
| [**R4-2206117**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206117.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |

#### TPs for Rx RF part of BS type 1-H

|  |  |  |
| --- | --- | --- |
| **CR/TP number** | **Align with work split?** | **Comments collection** |
| [**R4-2203955**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203955.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205056**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205056.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205475**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205475.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205847**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205847.zip) | Yes | Company A |
| Company B |
| THALES: this contribution should be considered in TR 38.863 (THALES is the leading company for TS 38.108, and in TR 38863 we provided the justification for the value) |
| [**R4-2205864**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205864.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205866**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205866.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205922**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205922.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205986**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205986.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |

#### TPs for Tx RF part of BS type 1-O

|  |  |  |
| --- | --- | --- |
| **CR/TP number** | **Align with work split?** | **Comments collection** |
| [**R4-2203957**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203957.zip) | Yes | Ericsson: see commented file |
|  |
|  |
| [**R4-2205057**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205057.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205477**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205477.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205848**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205848.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205878**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205878.zip) | No | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205880**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205880.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205886**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205886.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205979**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205979.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |

#### TPs for Rx RF part of BS type 1-O

|  |  |  |
| --- | --- | --- |
| **CR/TP number** | **Align with work split?** | **Comments collection** |
| [**R4-2203958**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203958.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205058**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205058.zip) | Yes | Company A |
| Company B |
|  |
| [**R4-2205478**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205478.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205851**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205851.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |
| [**R4-2205897**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205897.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205899**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205899.zip) | No | Company A |
| Company B |
|  |
| [**R4-2205981**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205981.zip) | Yes | Company A |
| Company B |
| Ericsson: see commented file |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)