**3GPP TSG-RAN WG4 Meeting #104-bis-e R4-22xxxxx**

**Online Meeting, 10 – 19 October 2022**

**Source: RAN4 vice chair (Samsung)**

**Title:** **RAN4#104-bis-e BS\_Demod\_Testing Session meeting minutes**

**Agenda Item:** **3.2**

**Document for:** **Information**

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| 302 | [104-bis-e][302] NR\_Repeater\_RFConformance\_Part1 | Rel-17 NR repeater RF conformance general part, conductive test cases | 4.1.5.1, 4.1.5.2 | Michal Szydelko AI 4.1.6 |
| 303 | [104-bis-e][303] NR\_Repeater\_RFConformance\_Part2 | Rel-17 NR repeater conformance radiated test cases | 4.1.5.3 | Huiping Shan AI 4.1.6 |
| 304 | [104-bis-e][304] NTN\_Solutions\_RF\_Maintenance | Rel-17 NR NTN WI: RF core maintenance (SAN RF, UE RF) | 4.2.1, 4.2.2, 4.2.4 | Dorin Panaitopol AI 4.2.8 |
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| 306 | [104-bis-e][306] NR\_exto71GHz\_BSRF | Rel-17 NR extending to 71GHz: BS RF requirements, BS RF conformance | 4.3.3, 4.3.4 | Michal Szydelko AI 4.3.8 |
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| 312 | [104-bis-e][312] NR\_NTN\_enh\_Part1 | Rel-18 NTN system parameters, regulatory and SAN RF | 6.22.1,6.22.3 | Dorin Panaitopol 6.22.5 |
| 313 | [104-bis-e][313] NR\_NTN\_enh\_Part2 | Rel-18 NTN co-existence evaluation | 6.22.2 | Yiran Jin 6.22.5 |
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| 316 | [104-bis-e][316] IoT\_NTN\_Co-existence\_SANRF | Rel-18 IoT NTN SAN RF,co-existence | 7.5.3, 7.5.4 | Fei Xue AI 7.5.7 |
| 317 | [104-bis-e][317] NR\_NTN\_Demod\_Part1 | Rel-17 NTN demodulation part: General, UE part | 4.2.7.1 4.2.7.3 | Bin Han AI 4.2.8 |
| 318 | [104-bis-e][318] NR\_NTN\_Demod\_Part2 | Rel-17 NTN demodulation part:BS part | 4.2.7.1 (BS part only) 4.2.7.2 | Tricia Li AI 4.2.8 |
| 319 | [104-bis-e][319] NR\_exto71GHz\_Demod\_Part1 | Rel-17 NR extending to 71GHz demodulation: General, BS part | 4.3.7.1, 4.3.7.3 | Rafael Paiva AI 4.3.8 |
| 320 | [104-bis-e][320] NR\_exto71GHz\_Demod\_Part2 | Rel-17 NR extending to 71GHz demodulation part | 4.3.7.2 | Pierpaolo Vallese  AI 4.3.8 |
| 321 | [104-bis-e][321] NR\_cov\_enh\_Demod | Rel-17 NR coverage enhancement WI: demodulation part | 4.4.2 | Jingzhou Wu AI 4.4.3 |
| 322 | [104-bis-e][322] NR\_FeMIMO\_Demod | Rel-17 FeMIMO: demodulation part | 4.5.3 | Yunchuan Yang AI 4.5.4 |
| 323 | [104-bis-e][323] NR\_RedCap\_Demod | Rel-17 Reduced capability NR device: demodulation part | 4.6.5 | Kazuyoshi Uesaka AI 4.6.6 |
| 324 | [104-bis-e][324] NR\_IIOT\_URLLC\_enh\_Demod | Rel-17 NR\_IIOT\_URLLC\_enh WI: Demodulation part | 4.7.3 | Axel Muller AI 4.7.4 |
| 325 | [104-bis-e][325] FS\_NR\_FR2\_OTA\_enh | Rel-18 FR2 OTA test method enhancement | 6.5 | Bin Han AI 6.5.4 |
| 326 | [104-bis-e][326] NR\_FR1\_TRP\_TRS\_enh | Rel-18 TRP/TRS enhancement | 6.14 | Ruixin Wang AI 6.14.3 |
| 327 | [104-bis-e][327] NR\_MIMO\_OTA\_enh | Rel-18 MIMO OTA enhancement | 6.15 | Xuan Yi AI 6.15.5 |

## 4 Rel-17 non-spectrum related on-going work items for NR and LTE

### 4.1 NR repeater

#### 4.1.1 General requirement maintenance

#### 4.1.2 Conductive RF core requirement maintenance

**R4-2216607 CR to 38.106: ACRR requirements**

*Type: CR For: Agreement  
 38.106 v17.2.0 CR-0023 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

**R4-2216610 CR to 38.106: EVM requirements**

*Type: CR For: Agreement  
 38.106 v17.2.0 CR-0024 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

**R4-2216613 CR to 38.106: ACLR requirements**

*Type: CR For: Agreement  
 38.106 v17.2.0 CR-0025 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

#### 4.1.3 Radiated RF core requirement maintenance

**R4-2215490 CR for 38.106 OOB gain radiated related requirements**

*Type: CR For: Approval  
 38.106 v17.2.0 CR-0022 rev Cat: F (Rel-17)  
  
 Source: CMCC*

**Decision:** The document was **not treated**.

#### 4.1.4 EMC core requirement maintenance and performance requirements

**R4-2215732 Discussion on NR repeater EMC performance assessment**

*Type: discussion For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2215733 Draft CR to TS38.114 repeater clause 8.1 R17**

*Type: draftCR For: Approval  
 38.114 v17.1.0 CR- rev Cat: F (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **withdrawn**.

**R4-2215960 Draft CR to TS 38.114 Clause 4.5**

*Type: draftCR For: Endorsement  
 38.114 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The missing content of clause 4.5 is introduced.

**Decision:** The document was **not treated**.

**R4-2216038 CR to TS38.114 repeater clause 8.1 R17**

*Type: CR For: (not specified)  
 38.114 v17.1.0 CR-0003 rev Cat: F (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 4.1.5 RF Conformance testing

##### 4.1.5.1 General

###### 4.1.5.1.1 Stimulus signal /Test models

**R4-2216192 NR Repeater stimulus signal**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216500 Repeater stimulus signal spectral purity annex**

*Type: discussion For: Agreement  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

###### 4.1.5.1.2 Test configurations

###### 4.1.5.1.3 Others

##### 4.1.5.2 Conductive conformance Testing

###### 4.1.5.2.1 Transmitted power related requirements

**R4-2216611 TP to 38.115-1: EVM requirement**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

**R4-2216838 TP to TS 38.115-1: Repeater output power (6.1, 6.2)**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the conducted conformance test specification TS 38.115-1 for the NR repeater.

**Decision:** The document was **not treated**.

###### 4.1.5.2.2 Emission requirements

**R4-2216608 TP to 38.115-1: ACRR requirement**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

**R4-2216614 TP to 38.115-1: ACLR requirement**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

###### 4.1.5.2.3 Others

**R4-2215387 TP for TS 38.115-1: scope and reference**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216837 TP to TS 38.115-1: Measurement uncertainties and test requirements (4.1)**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the conducted conformance test specification TS 38.115-1 for the NR repeater.

**Decision:** The document was **not treated**.

**R4-2216839 TP to TS 38.115-1: Annex B: Environmental requirements for the repeater**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the conducted conformance test specification TS 38.115-1 for the NR repeater.

**Decision:** The document was **not treated**.

**R4-2216840 TP to TS 38.115-1: Annex C: Test tolerances and derivation of test requirements**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the conducted conformance test specification TS 38.115-1 for the NR repeater.

**Decision:** The document was **not treated**.

**R4-2216841 TP to TS 38.115-1: Annex E: Characteristics of interfering signals**

*Type: pCR For: Approval  
 38.115-1 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the conducted conformance test specification TS 38.115-1 for the NR repeater.

**Decision:** The document was **not treated**.

##### 4.1.5.3 Radiated conformance Testing

**R4-2216567 TP for TS 38.115-2: Scope, reference and editorial changes**

*Type: pCR For: Endorsement  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216568 TS 38.115-2**

*Type: draft TS For: Endorsement  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

###### 4.1.5.3.1 Transmitted power related requirements

**R4-2216612 TP to 38.115-2: OTA EVM requirement**

*Type: pCR For: Approval  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: NEC*

**Discussion:**

* Ericsson: We prefer the core requirements as it is, and we can add some clarification into conformance specification.
* Keysight: We prefer to modify both core and conformance specification with referred to ideal signals for EVM definition.
* Huawei: We prefer to further check both core and conformance specification.
* CMCC: We support the motivation from NEC, refine the wording as “ideal symbols at the input of repeater”.
* CATT: During test, the ideal symbols recovered by receiver side.
* Ericsson: We can further discuss the refinement on core specifications, and for the conformance test, test procedure can be clarified.

**Decision:** The document was **not treated**.

**R4-2216843 TP to TS 38.115-2: OTA output power (6.1, 6.2)**

*Type: pCR For: Approval  
 38.115-2 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the radiated conformance test specification TS 38.115-2 for the NR repeater.

**Decision:** The document was **not treated**.

###### 4.1.5.3.2 Emission requirements

**R4-2215791 Discussion on test tolerance values of OOB Gain for FR2 repeater**

*Type: other For: Approval  
 Source: NTT DOCOMO, INC.*

**Decision:** The document was **not treated**.

**R4-2216194 Draft CR to TS 38.115-2 with updates and corrections**

*Type: pCR For: Approval  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216609 TP to 38.115-2: OTA ACRR requirement**

*Type: pCR For: Approval  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

**R4-2216615 TP to 38.115-2: OTA ACLR requirement**

*Type: pCR For: Approval  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: NEC*

**Decision:** The document was **not treated**.

###### 4.1.5.3.3 Others

**R4-2215388 TP for TS 38.115-2: scope and reference**

*Type: pCR For: Approval  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215389 Discussion of remaining issues for FR2 MU**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216193 TP to TS 38.115-2 – Annex I TRP measurement procedures**

*Type: pCR For: Approval  
 38.115-2 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216407 Spectrum purity requirements for FR2**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Proposal for FR2 spectrum purity

**Decision:** The document was **not treated**.

**R4-2216408 Draft CR to 38.115-2: Spectrum purity requirements**

*Type: draftCR For: Endorsement  
 38.115-2 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Proposal for FR2 spectrum purity

**Decision:** The document was **not treated**.

**R4-2216842 TP to TS 38.115-2: Measurement uncertainties and test requirements (4.1)**

*Type: pCR For: Approval  
 38.115-2 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the radiated conformance test specification TS 38.115-2 for the NR repeater.

**Decision:** The document was **not treated**.

**R4-2216844 TP to TS 38.115-2: Annex A: Environmental requirements for the repeater**

*Type: pCR For: Approval  
 38.115-2 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the radiated conformance test specification TS 38.115-2 for the NR repeater.

**Decision:** The document was **not treated**.

**R4-2216845 TP to TS 38.115-2: Annex B: Test tolerances and derivation of test requirements**

*Type: pCR For: Approval  
 38.115-2 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the radiated conformance test specification TS 38.115-2 for the NR repeater.

**Decision:** The document was **not treated**.

**R4-2216846 On the need for the Annex on Characteristics of interfering signals in TS 38.115-2**

*Type: discussion For: Agreement  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we were supposed to provide a TP to the radiated conformance test specification TS 38.115-2 for the NR repeater, capturing an annex on the “Characteristics of interfering signals”. Based on initial analysis, we formul

**Decision:** The document was **not treated**.

#### 4.1.6 Moderator summary and conclusions

**[104-bis-e][301] NR\_Repeater\_RFMaintenance, AI 4.1.1,4.1.2,4.1.3,4.1.4– Golebiowski, Bartlomiej**

**R4-2216885 Email discussion summary for [104-bis-e][301] NR\_Repeater\_RFMaintenance**

*Type: other For: Information  
 Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

**[104-bis-e][302] NR\_Repeater\_RFConformance\_Part1, AI 4.1.5.1, 4.1.5.2- Michal Szydelko**

**R4-2216886 Email discussion summary for [104-bis-e][302] NR\_Repeater\_RFConformance\_Part1**

*Type: other For: Information  
 Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 12th**

**Sub-topic 1-1: Improvements to the stimulus signal requirements**

* Proposals (non-exclusive)
  + Proposal 1: For NR Repeater stimulus signal, spectral purity requirements should be design similar way, and experience there could be reused (Nokia, R4-2216192)
  + Proposal 2: Although it was agreed to re-use E-UTRA repeater specification for FR1 stimulus signal spectral purity requirements, revert this agreement and revise stimulus signal spectral purity requirement for FR1. This is because of findings of original intention and motivation of E-UTRA specification and difference of stimulus signal and testing between E-UTRA and 5G NR (Keysight, R4-2216500)
  + Proposal 3: For both FR1 and FR2 5G NR repeater specification, state following as signal spectral purity requirements, because it is obvious that stimulus signal should clear test requirement by itself (Keysight, R4-2216500).
    - Option 1. State as “Stimulus signal spectral purity should clear test requirement by stimulus signal itself.” And remove current table for FR1.
    - Option 2. Remove Stimulus signal spectral purity requirement Annex from 5G NR repeater test specification.
* GTW discussion:
  + Huawei: We suggest to refine existing stimulus signal requirements to be aligned with NR specification.
  + ZTE: We disagree to remove the requirements; we can make adjustment to be applicable for NR specification with 5MHz.
  + Keysight: We are ok to specify the requirements. We suggest to revise the requirements with ACP type (The ratio of noise level in adjacent channel to in-band power).
  + Nokia: We share similar view as Huawei/ZTE to refine the requirements to be applicable for NR specification.
  + CATT: We are ok to accept option 1 from Keysight. Test components also used for NR conformance test cases; it’s should be fine with option 1.
  + Ericsson: We support to specify the requirements to be aligned with NR specification. We should ensure the OBUE requirements will not be failed due to test equipment. We can further discuss how to guarantee this with proper requirements.
  + Huawei: I referred to the proposal of removing requirements which revert previous agreement. We prefer to have specific requirements.
* Agreement: Spectral purity requirements shall be specified for NR Repeater stimulus signal, further discuss the details with NR requirement as starting point
  + Option 1: Absolute power level
  + Option 2: Relative power e.g., ACP type

**Conclusions after 2nd round**

**[104-bis-e][303] NR\_Repeater\_RFConformance\_Part3, AI 4.1.5.3- Huiping Shan**

**R4-2216887 Email discussion summary for [104-bis-e][303] NR\_Repeater\_RFConformance\_Part2**

*Type: other For: Information  
 Source: Moderator (CATT)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 12th**

**Issue 2-1: MU/TT for FR2**

* Proposals
  + Proposal 1: MU values in R4-2215389

|  |  |  |
| --- | --- | --- |
| Subclause | Maximum Test System Uncertainty and Range over which Test System Uncertainty applies | Comments |
| 7.3 OTA Frequency stability | ±12 Hz  Measurement results of ± 5000 Hz | 5000 Hz equals 0.1ppm of 50 GHz |
| 6.4 OTA Out of band gain | ±1.7 dB (24.25 – 29.5 GHz)  ±2.0 dB (37 – 43.5 GHz)  ±2.2 dB (43.5 GHz < f ≤ 48.2 GHz)  Proposal from NTT DoComo   * 2.1 dB, 24.25GHz < f ≦ 29.5GHz * 2.4 dB, 37GHz < f ≦ 43,5GHz * 2.6 dB, 43.5GHz < f ≦ 48.2GHz | Reuse output power MU |
| 7.7 OTA Input intermodulation | ±2.0 dB, f ≤ 3.0 GHz  ±2.6 dB, 3.0 GHz < f ≤ 4.2 GHz  ±3.2 dB, 4.2 GHz < f ≤ 6.0 GHz | Reuse BS receiver intermodulation MU |
| 7.8 OTA Adjacent channel rejection ratio | ±2.7 dB (24.25 – 29.5 GHz)  ±2.7 dB (37 – 43.5 GHz)  ±2.9 dB (43.5 GHz < f ≤ 48.2 GHz) | Reuse absolute ACLR MU |

* + Proposal 2: Proposal in R4-2215791

Proposal 1: RAN4 consider following values as baseline for maximum TT values of OOB Gain for FR2 repeaters.

* 2.1 dB, 24.25GHz < f ≦ 29.5GHz
* 2.4 dB, 37GHz < f ≦ 43,5GHz
* 2.6 dB, 43.5GHz < f ≦ 48.2GHz
* GTW discussion:
  + CATT: For out of band gain with proposal 2, and others follow proposal 1.
  + Keysight: We suggest to keep [] on the value.
  + NTT DoCoMo: We are fine with the proposal from CATT and Keysight. There is difference between out of band gain and output power.
  + Huawei: We would like to know how the values come from.
  + CATT: We provide some analysis in previous meeting; TE vendors’ feedback is appreciated.
* Agreement: Take below values as baseline with [ ], further feedback from TE vendors are encouraged.

|  |  |
| --- | --- |
| Subclause | Maximum Test System Uncertainty and Range over which Test System Uncertainty applies |
| 7.3 OTA Frequency stability | ±[12] Hz  Measurement results of ± [5000] Hz |
| 6.4 OTA Out of band gain | ±[2.1] dB, 24.25GHz < f ≦ 29.5GHz  ±[2.4] dB, 37GHz < f ≦ 43,5GHz  ±[2.6] dB, 43.5GHz < f ≦ 48.2GHz |
| 7.7 OTA Input intermodulation | ±[2.0] dB, f ≤ 3.0 GHz  ±[2.6] dB, 3.0 GHz < f ≤ 4.2 GHz  ±[3.2] dB, 4.2 GHz < f ≤ 6.0 GHz |
| 7.8 OTA Adjacent channel rejection ratio | ±[2.7] dB (24.25 – 29.5 GHz)  ±[2.7] dB (37 – 43.5 GHz)  ±[2.9] dB (43.5 GHz < f ≤ 48.2 GHz) |

**Issue 2-2: Spectrum purity requirements**

* Proposals
  + The following is put forward for a spectrum purity mask for the TE (defined as EIS at the repeater RIB):

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency offset of measurement filter -3 dB point, Δf** | **Frequency offset of measurement filter centre frequency, f\_offset** | **Limit** | ***Measurement bandwidth*** |
| 0 MHz ≤ Δf < 0.1\*BWcontiguous | 0.5 MHz ≤ f\_offset < 0.1\* BWcontiguous +0.5 MHz | -122 dBm | 1 MHz |
| 0.1\*BWcontiguous ≤ Δf < ΔfB | 0.1\* BWcontiguous +0.5 MHz ≤ f\_offset < ΔfB +0.5 MHz | -108 dBm | 1 MHz |
| ΔfB ≤ Δf < Δfmax | ΔfB +5 MHz ≤ f\_offset < f\_ offsetmax | -85 dBm | 10 MHz |

* GTW discussion:
  + Ericsson: We introduce the values based on the out of band gain assumption with 20 dB lower than the requirements.
  + ZTE: Limit in close the edge quite low than the far range which is not aligned with emission mask requirements.
  + Keysight: We can specify the requirement in the input other than output. We can consider to introduce ACP type requirement with relative power ratio.
  + Ericsson: Out of band gain is going decreased with frequency away from channel edge. Considering ACP type need to ensure absolute power level requirements.
  + Huawei: We suggest to have a WF to capture the detailed proposal covering both conductive and radiated requirements.
  + CATT: We agree with Huawei, the assumption should be applied for both FR1 and FR2.

**Session chair note: Continue the discussion on Spectrum purity requirements of stimulus signal over email thread [302] for both FR1 and FR2, a WF can be considered to capture the details.**

**Issue 2-3: Annex on the “Characteristics of interfering signals”**

* Proposals
  + Not to introduce an annex on the “Characteristics of interfering signals” to the TS 38.115-2
* GTW discussion:
  + CATT: Suggest to remove the annex and keep the information into requirement clause (ACRR) for “Characteristics of interfering signals” in TS 38.115-1/-2.
  + ZTE: This information needed for ACRR requirements. Remove the annex section or the contents?
* Agreement: Remove the annex and keep the information into requirement clause ([ACRR]) for “Characteristics of interfering signals” in TS 38.115-1/-2.

**Conclusions after 2nd round**

### 4.2 Solutions for NR to support non-terrestrial networks (NTN)

#### 4.2.1 System parameters maintenance

**R4-2216150 CR to 38.101-5: Corrections on section 5.3.3 for NTN UE**

*Type: CR For: Agreement  
 38.101-5 v17.1.0 CR-0006 rev Cat: F (Rel-17)  
  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

#### 4.2.2 Satellite Access Node RF requirement maintenance

**R4-2215336 Corrections to SAN TS 38.108**

*Type: CR For: Decision  
 38.108 v17.1.0 CR-0012 rev Cat: F (Rel-17)  
  
 Source: THALES*

**Abstract:**

Correct some typos, symbols, remove symbols not used, correct definitions, correct BWchannel, and align text/fonts. OBUE corrections for ?fOBUE (MHz) values are aligned with ITU-R SM.1541-6 recommendation.

**Decision:** The document was **not treated**.

**R4-2215337 Discussion on SAN Out-of-Band Mask**

*Type: discussion For: Decision  
 Source: THALES*

**Abstract:**

This contribution proposes to discuss Out-of-Band (OoB) Mask for SAN TS 38.108 and related OBUE requirements resulted from ITU-R SM.1541-6.

**Decision:** The document was **not treated**.

**R4-2215412 CR for TS 38.108, Corrrect definiiton order in sub-clause 3.1**

*Type: CR For: Agreement  
 38.108 v17.1.0 CR-0013 rev Cat: F (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

##### 4.2.2.1 Conductive RF requirements

**R4-2216064 CR for TR 38.863 to maintain SAN parts**

*Type: CR For: Agreement  
 38.863 v17.1.0 CR-0003 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216065 Discussion on definition of delta FOBUE**

*Type: other For: Approval  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216066 CR for 38.108 to maitain unwanted emissions clause**

*Type: CR For: Agreement  
 38.108 v17.1.0 CR-0015 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216526 NTN - Discussion on remaining open issues**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

This contribution discusses the remaining open issues from RAN4#103-e meeting

**Decision:** The document was **not treated**.

**R4-2216527 CR to TS 38.108 - Updates related to DfOBUE - conducted clauses**

*Type: CR For: Approval  
 38.108 v17.1.0 CR-0016 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This contribution is a CR to TS 38.108, removing reference to DfOBUE in the conducted sub-clauses

**Decision:** The document was **not treated**.

##### 4.2.2.2 Radiated RF requirements

**R4-2216528 CR to TS 38.108 - Updates related to DfOBUE - radiated clauses**

*Type: CR For: Approval  
 38.108 v17.1.0 CR-0017 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This contribution is a CR to TS 38.108, removing reference to DfOBUE in the radiated sub-clauses

**Decision:** The document was **not treated**.

#### 4.2.3 Satellite Access Node RF conformance testing

##### 4.2.3.1 General and work plan

**R4-2215802 TS 38.181 v0.2.0 NR Satellite Access Node (SAN) conformance testing**

*Type: draft TS For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

###### 4.2.3.1.1 Test Model

**R4-2215401 TP for TS 38.181 – Clause 4.9 RF channels and test models**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

###### 4.2.3.1.2 Test configuration

**R4-2215350 TP for TS 38.181 - Annex D**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: THALES*

**Abstract:**

This contribution provides a Text Proposal for SAN conformance testing.

**Decision:** The document was **not treated**.

**R4-2215400 TP for TS 38.181 – Clause 4.7 Test configurations and Clause 4.8 Applicability of requirements**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

###### 4.2.3.1.3 Others

**R4-2215338 Discussion on SAN Test Conditions**

*Type: discussion For: Discussion  
 Source: THALES*

**Abstract:**

This contribution proposes to discuss the (extreme) test conditions for TS 38.181.

**Decision:** The document was **not treated**.

**R4-2215397 TP for TS 38.181 – Clause 1 Scope, Clause 2 References and Clause 3 Definition of terms, symbols and abbreviations**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215398 TP for TS 38.181 – Clause 4.1 Measurement uncertainties and test requirements**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215399 TP for TS 38.181 – Clause 4.6 Manufacturer declarations**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215406 TP for TS 38.181 – A.1 FRCs for RF Rx requriement(QPSK, R=1/3) and A.2 FRCs for dynamic range (16QAM, R=2/3)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215407 TP for TS 38.181 – Annex F Calibration**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215408 TP for TS 38.181 – Annex H In-channel Tx test**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215409 TP for TS 38.181 – Annex I Transmitter spatial emissions declaration**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215410 TP for TS 38.181 – Annex K Measuring noise close to the noise-floor**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215411 Discussion on conformance testing for NTN SAN**

*Type: other For: Approval  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216195 TP to TS 38.181 – Clauses 4.10 and 4.11**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216489 TS 38.181: TP on clause 5**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Text proposal on the new TS 38.181 - Satellite Access Node (SAN) conformance testing

**Decision:** The document was **not treated**.

**R4-2216491 TS 38.181: TP on Annex B**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Text proposal on the new TS 38.181 - Satellite Access Node (SAN) conformance testing

**Decision:** The document was **not treated**.

**R4-2216492 TS 38.181: TP on Annex C**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Text proposal on the new TS 38.181 - Satellite Access Node (SAN) conformance testing

**Decision:** The document was **not treated**.

**R4-2216493 TS 38.181: TP on Annex E**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Text proposal on the new TS 38.181 - Satellite Access Node (SAN) conformance testing

**Decision:** The document was **not treated**.

**R4-2216494 TS 38.181: TP on Annex J**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Text proposal on the new TS 38.181 - Satellite Access Node (SAN) conformance testing

**Decision:** The document was **not treated**.

**R4-2216495 Discussion on relevant test environment for SAN**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on the relevant test environment for SAN with focus on the differences from BS

**Decision:** The document was **not treated**.

**R4-2216847 TP to TS 38.181: General test conditions and declarations (4.2 - 4.5)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

##### 4.2.3.2 Conductive conformance Testing

###### 4.2.3.2.1 Tx requirements

**R4-2215339 TP for TS 38.181 - Clause 6.5.3 EVM**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: THALES, CATT*

**Abstract:**

In this proposal, the previous contribution from TP R4-2214834 (THALES) is updated accordingly taking into account current TM.

**Decision:** The document was **not treated**.

**R4-2215340 TP for TS 38.181 - Clause 6.6.4 OBUE**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: THALES*

**Abstract:**

This contribution provides a Text Proposal for SAN OBUE conformance testing.

**Decision:** The document was **not treated**.

**R4-2215341 TP for TS 38.181 - Clause 6.6.5 Spurious Emissions**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: THALES*

**Abstract:**

This contribution provides a Text Proposal for SAN Spurious Emissions conformance testing.

**Decision:** The document was **not treated**.

**R4-2215349 TP for TS 38.181 - Occupied BandWidth Clauses 6.6.1 and 6.6.2**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: THALES*

**Abstract:**

This contribution provides a Text Proposal for SAN conformance testing.

**Decision:** The document was **not treated**.

**R4-2215402 TP for TS 38.181 – Clause 6.1 General and Clause 6.2 Satellite Access Node output power**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT, THALES*

**Decision:** The document was **not treated**.

**R4-2216561 TP for TS 38.181: Section 6.3 Output power dynamics**

*Type: pCR For: Endorsement  
 38.181 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216848 TP to TS 38.181: occupied bandwidth (6.6.1, 6.6.2)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

**R4-2216849 TP to TS 38.181: OBUE (6.6.4)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

###### 4.2.3.2.2 Rx requirements

**R4-2215403 TP for TS 38.181 – Clause 7.1 General and Clause 7.2 Reference sensitivity level**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216196 TP to TS 38.181 – Clause 7.4 In-band selectivity and blocking**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216562 TP for TS 38.181: Section 7.3 Dynamic range**

*Type: pCR For: Endorsement  
 38.181 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216563 TP for TS 38.181: Section 7.6~7.8**

*Type: pCR For: Endorsement  
 38.181 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216850 TP to TS 38.181: Out-of-band blocking (7.5)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

###### 4.2.3.2.3 MU assessment

##### 4.2.3.3 Radiated conformance Testing

###### 4.2.3.3.1 Tx requirements

**R4-2215404 TP for TS 38.181 – Clause 9.1 General**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216564 TP for TS 38.181: Section 9.4 OTA output power dynamics**

*Type: pCR For: Endorsement  
 38.181 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216851 TP to TS 38.181: OTA occupied bandwidth (9.7.1, 9.7.2)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

**R4-2216852 TP to TS 38.181: OTA ACLR (9.7.3)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

**R4-2216853 TP to TS 38.181: OTA OBUE (9.7.4)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

###### 4.2.3.3.2 Rx requirements

**R4-2215405 TP for TS 38.181 – Clause 10.1 General and Clause 10.2 OTA sensitivity**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216197 TP to TS 38.181 – Clause 10.5 In-band selectivity and blocking**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216490 TS 38.181: TP on clause 10.3 OTA refsens**

*Type: pCR For: Decision  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Text proposal on the new TS 38.181 - Satellite Access Node (SAN) conformance testing

**Decision:** The document was **not treated**.

**R4-2216565 TP for TS 38.181: Section 10.4 OTA dynamic range**

*Type: pCR For: Endorsement  
 38.181 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216566 TP for TS 38.181: Section 10.7~10.9**

*Type: pCR For: Endorsement  
 38.181 v0.0.1 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216854 TP to TS 38.181: OTA out-of-band blocking (10.6)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

Based on the pre-arranged work-split, we provide TP to the NTN SAN conformance test specification TS 38.181.

**Decision:** The document was **not treated**.

###### 4.2.3.3.3 MU assessment

#### 4.2.4 UE RF requirement maintenance

**R4-2215315 CR: 0005 Doppler test conditions for RF requirements 38.101-5**

*Type: CR For: Agreement  
 38.101-5 v17.1.0 CR-0005 rev Cat: F (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216593 On decoupling DL MIMO from number of Rx branches for NTN UE capabilities**

*Type: discussion For: Decision  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216594 CR to 38.101-5 on corrections related to 64QAM requirements**

*Type: CR For: Agreement  
 38.101-5 v17.1.0 CR-0007 rev Cat: F (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216640 On NTN Frequency error requirment**

*Type: discussion For: Approval  
 Source: Ericsson*

**Abstract:**

In this paper, we present our view on the improvement of NTN Frequency error requirement

**Decision:** The document was **not treated**.

**R4-2216641 CR on NTN Frequency error requirement**

*Type: CR For: Agreement  
 38.101-5 v17.1.0 CR-0008 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

In this paper, improvement of NTN Frequency error requirement is introduced.

**Decision:** The document was **not treated**.

**R4-2216835 NR NTN Frequency Error**

*Type: discussion For: Discussion  
 Source: MediaTek (Chengdu) Inc.*

**Decision:** The document was **not treated**.

#### 4.2.7 Demodulation requirements

##### 4.2.7.1 General

**R4-2215344 Work Split for Performance Requirements in TS 38.108 and TS 38.181**

*Type: discussion For: Discussion  
 Source: THALES*

**Abstract:**

This contribution proposes to further discuss and decide the work split for TS 38.108 conducted and OTA performance requirements at RAN4#104-bis-e. As a further outcome of offline discussions, it is proposed also to further discuss and decide the work spl

**Decision:** The document was **not treated**.

**R4-2215674 Discussion on NTN channel model**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Clarify the channel model profile for NLOS and LOS channel

**Decision:** The document was **not treated**.

**R4-2215976 Discussion on UE NTN demod general**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

##### 4.2.7.2 Satellite Access Node demodulation requirements

**R4-2215977 Summary of simulation results for NTN SAN demodulation performance requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215978 Big CR on NTN SAN performance requirements (TS38.108, Rel-17)**

*Type: CR For: Agreement  
 38.108 v17.1.0 CR-0014 rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215979 Draft CR on propagation conditions of NTN SAN performance requirements (TS38.108, Rel-17)**

*Type: draftCR For: Endorsement  
 38.108 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215980 pCR on FRC of NTN SAN performance requirements (TS38.181, Rel-17)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

###### 4.2.7.2.1 PUSCH requirements

**R4-2215548 Simulation results for NTN SAN PUSCH demodulation**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution discusses aspects related to NTN SAN PUSCH demodulation requirements.

**Decision:** The document was **not treated**.

**R4-2215549 Discussion on NTN SAN PUSCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution discusses aspects related to NTN SAN PUSCH demodulation requirements.

**Decision:** The document was **not treated**.

**R4-2215675 Discussion on general and PUSCH issue SAN demodulation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discuss remianing open issues on PUSCH

**Decision:** The document was **not treated**.

**R4-2215677 Simulation results for SAN PUSCH demodulation**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2215680 draftCR for TS38.108 introduce FRC tables for SAN PUSCH demodulation**

*Type: draftCR For: Endorsement  
 38.108 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introducing FRC tables for PUSCH requirements

**Decision:** The document was **not treated**.

**R4-2215682 draftCR for TS38.181 introduce SAN PUSCH conducted demodulation requirements and Annex for test setup**

*Type: draftCR For: Endorsement  
 38.181 v0.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introducing conducted requirements for PUSCH and test setup discription

**Decision:** The document was **not treated**.

**R4-2215981 Discussion on satellite NTN demod PUSCH**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215982 Simulation results on satellite NTN demod PUSCH**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215983 Draft CR on NTN SAN PUSCH performance requirements (TS38.108, Rel-17)**

*Type: draftCR For: Endorsement  
 38.108 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215984 pCR on NTN SAN PUSCH performance requirements (TS38.181, Rel-17)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216697 Initial simulation results on PUSCH demodulation requirement for Rel-17 NTN**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

###### 4.2.7.2.2 PUCCH requirements

**R4-2215550 Simulation results for NTN SAN PUCCH demodulation**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution discusses aspects related to NTN SAN PUCCH demodulation requirements.

**Decision:** The document was **not treated**.

**R4-2215551 Discussion on NTN SAN PUCCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution discusses aspects related to NTN SAN PUCCH demodulation requirements.

**Decision:** The document was **not treated**.

**R4-2215676 Discussion on general and PUCCH issue SAN demodulation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discuss remianing open issues on PUCCH

**Decision:** The document was **not treated**.

**R4-2215678 Simulation results for SAN PUCCH demodulation**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2215681 draftCR for TS38.108 introduce requirements for SAN PUSCH demodulation**

*Type: draftCR For: Endorsement  
 38.108 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introducing requirements for PUCCH

**Decision:** The document was **not treated**.

**R4-2215683 draftCR for TS38.181 introduce SAN PUCCH radiated demodulation requirements**

*Type: draftCR For: Endorsement  
 38.181 v0.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introducing radiated requirements for PUCCH

**Decision:** The document was **not treated**.

**R4-2215985 Discussion on satellite NTN demod PUCCH**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215986 Simulation results on satellite NTN demod PUCCH**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215987 pCR on NTN SAN PUCCH performance requirements (TS38.181, Rel-17)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216698 Initial simulation results on PUCCH demodulation requirement for Rel-17 NTN**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

###### 4.2.7.2.3 PRACH requirements

**R4-2215679 Simulation results for SAN PRACH demodulation**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2215684 draftCR for TS38.181 introduce SAN PRACH conducted demodulation requirements**

*Type: draftCR For: Endorsement  
 38.181 v0.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introducing conducted requirements for PRACH

**Decision:** The document was **not treated**.

**R4-2215988 Simulation results on satellite NTN demod PRACH**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215989 Draft CR on NTN SAN PRACH performance requirements (TS38.108, Rel-17)**

*Type: draftCR For: Endorsement  
 38.108 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215990 pCR on NTN SAN PRACH performance requirements (TS38.181, Rel-17)**

*Type: pCR For: Approval  
 38.181 v0.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216699 Initial simulation results on PRACH demodulation requirement for Rel-17 NTN**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

##### 4.2.7.3 UE demodulation requirements

**R4-2215991 Draft CR on general part of UE NTN performance requirements (TS38.101-5, Rel-17)**

*Type: draftCR For: Endorsement  
 38.101-5 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

###### 4.2.7.3.1 PDSCH requirements

**R4-2215546 Discussion on PDSCH demodulation requirements for NTN**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution discusses aspects related to NTN PDSCH demodulation requirements for NTN.

**Decision:** The document was **not treated**.

**R4-2215547 Simulation results on PDSCH demodulation requirements for NTN**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution provides simulation results of PDSCH demodulation requirements for NTN.

**Decision:** The document was **not treated**.

**R4-2215583 On PDSCH demod requirements for NTN**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215584 Draft CR on Propagation Conditions, Physical Channels, Environmental Conditions for NTN**

*Type: draftCR For: Endorsement  
 38.101-5 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215860 Simulation Results on NTN UE PDSCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2215861 Views on NTN UE PDSCH Requirements**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2215992 Discussion on UE NTN demod PDSCH**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215993 Simulation results on satellite NTN demod PDSCH**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215994 Draft CR on applicability rules of UE NTN performance requirements (TS38.101-5, Rel-17)**

*Type: draftCR For: Endorsement  
 38.101-5 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216394 Discussion on the remaining issues for PDSCH requirement of NTN**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the 64QAM and 30kHz SCS scenario for NTN UE requirement.

**Decision:** The document was **not treated**.

**R4-2216395 Simulation results for PDSCH requirement of NTN**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

This contribution provides our simulation results for PDSCH with NTN-TDLA and NTN-TDLC channel models

**Decision:** The document was **not treated**.

**R4-2216396 draft CR to 38.101-5: Throughput and reference channel definition**

*Type: draftCR For: Endorsement  
 38.101-5 v17.1.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR brings the definition of throughput and reference channel of NTN

**Decision:** The document was **not treated**.

**R4-2216420 Summary of simulation results for NTN UE demodulation**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216705 Discussion on PDSCH requirements for NR-NTN**

*Type: discussion For: Discussion  
 Source: MediaTek inc.*

**Decision:** The document was **not treated**.

#### 4.2.8 Moderator summary and conclusions

**[104-bis-e][304] NTN\_Solutions\_RF\_Maintenance, AI 4.2.1, 4.2.2, 4.2.4– Dorin Panaitopol**

**R4-2216888 Email discussion summary for [104-bis-e][304] NTN\_Solutions\_RF\_Maintenance**

*Type: other For: Information  
 Source: Moderator (Thales)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

**[104-bis-e][305] NTN\_Solutions\_RFConformance, AI 4.2.3– Dominique Everaere**

**R4-2216889 Email discussion summary for [104-bis-e][305] NTN\_Solutions\_RFConformance**

*Type: other For: Information  
 Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

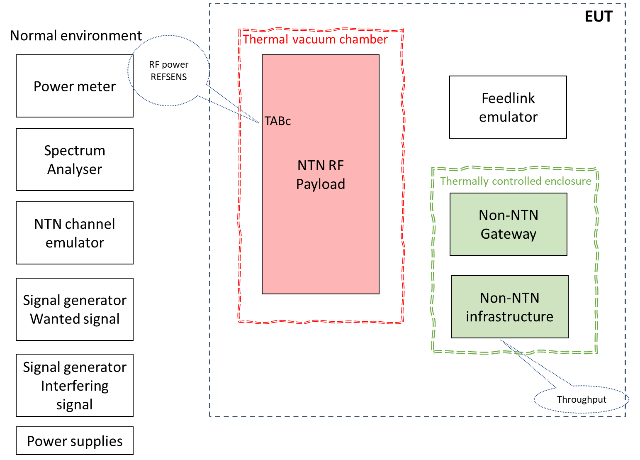
**GTW discussion on Oct 12th**

**Issue 1-1-1: Extreme conditions**

* Proposals: Consider SAN testing under extreme conditions
  + No (Thales)
    - They are depending on the mission requirements which are specific to launcher, orbit, space craft design, life time, risk mitigation strategy…
  + Yes (Ericsson)
    - Similar to TN BS, at the extreme points for power supply and temperatures supported by the equipment, as declared by manufacturer.
* GTW discussion:
  + Ericsson: We would like to close valium condition for the NTN components over the air. The power supply and temperature shall be manufacture declaration basis. Without extreme condition, the conformance test is unrealistic condition.
  + Thales: All extreme conditions/mission requirements are public by space agency. (Regulatory bodies)
  + Huawei: We can understand the concern from Ericsson. But we can consider the extreme condition indirectly way. We need to understand on the deployment aspect further.
  + ZTE: Seems we have much details need for more discussion, considering the timeline we cann’t conclude in Rel-17 performance part. We can add some informative note the extreme condition can be referred to other regulatory bodies.
  + Ericsson: Extreme conditions only considered for output power and REFSENS. This is based on declared basis. Not to have unified test environments.
  + Hughes: There are several parameters included in extreme conditions for Satellite bus. It maybe impractical to standardize such parameters and extreme conditions.
  + Thales: We agree with Hughes. The situation for orbit is complicated and the NTN is transparent payload, it’s not proper to specify this.
* Agreement: Further consider the extreme condition in Rel-17 RF conformance maintenance phase.
  + CR can be considered to capture some informative information to TR 38.863.

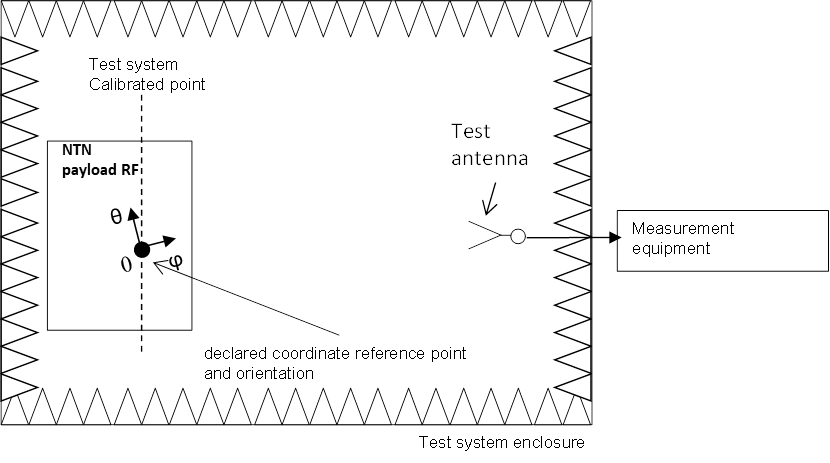
**Issue 1-2-2: Test setup – testing enclosures**

* Proposals: Consider different enclosures for the two equipment classes (as shown in following figure):
  + - Thermally controlled vacuum chamber for SAN NTN equipment
    - Environmental enclosure for SAN non-NTN equipment



* + Yes (Ericsson)
  + No, please elaborate why and/or propose other options.
* GTW discussion:
  + CATT: The NTN conformance test is only for RF payload; we didn’t see the necessity of introducing different classes here.
  + Thales: We already agreed not to consider extreme condition. Thermal vacuum chamber seems related to that discussion.
  + ZTE: We specify Rx requirements for SAN which using non-NTN infrastructure for T-put collection. We suggest to consider the diagram from CATT as baseline and further discuss updated in maintenance phase.
  + Ericsson: We think thermally vacuum condition is normal condition for NTN RF payload.
  + ZTE: We may no need to capture this into figures. The connection between different components still missing.
  + Ericsson: We may have two nominal environments for different components. Vacuum condition is nominal environment for components into space.
  + Hughes: We have complicated environment for the airspace which is quite different compared to the BS conformance test in 3GPP specifications.
  + Huawei: Seem some details out of 3GPP.

**Issue 1-2-3: Measurement setup**

* Proposal: OTA measurement setup for TN in annex of TS 38.141-2 can be reused for NTN, and NR BS in measurement setup figure should be replaced by NTN payload RF
* 
  + Yes (CATT)
  + No.
* GTW Discussion:
  + ZTE: We can take this baseline to consider other components.
  + Huawei: The size of chamber shall be specified, not clear whether existing CATR can be applicable or not.
  + ZTE: We need to check the applicable test chambers need to be re-evaluated. More feedback from TE vendors and Satellite industry required.
  + CATT: We are fine to further check the aspect as Huawei mentioned.
* Agreement
  + OTA measurement setup for TN in annex of TS 38.141-2 can be considered as baseline for NTN; further discuss below aspects:
    - Connections between different components
    - The size of chamber and applicable test methods

**Issue 1-5-4: Co-location requirement**

* Proposal: If keeping BS receiver of own or different BS requirement as co-location requirement.
  + Yes (CATT), following work then be needed:
    - Add co-location requirement in clause 4.9 in TS 38.108.
    - In TS 38.108, the total power of any spurious emission from both polarizations of the co-location reference antenna connector output shall not exceed the basic limits in clause 6.6.5.2.2 + X dB, where X = -30 dB.
    - Co-location and CLTA related declaration, MU, and requirement need to be added in TS 38.181.
  + No.
* GTW discussion:
  + ZTE: We think existing co-location reference antenna from TN can’t reused for SAN conformance test cases. We suggest to remove the co-location requirements from receiver side or continue the effort.
  + Huawei: We share the same concern as ZTE. We have previous agreement co-location requirements not applicable for SAN. We prefer to remove that co-location requirements.
  + CATT: If we remove the co-location requirements, how to test spurious emission requirements for protection of SAN receiver.
  + Huawei: The co-location requirements introduced for AAS, seems not realistic for SAN.
* Further discuss whether co-location requirements of SAN receiver can be removed or not

**Conclusions after 2nd round**

**[104-bis-e][317] NR\_NTN\_Demod\_Part1, AI 4.2.7.1, 4.2.7.3– Bin Han**

**R4-2216901 Email discussion summary for [104-bis-e][317] NR\_NTN\_Demod\_Part1**

*Type: other For: Information  
 Source: Moderator (Qualcomm)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 11th**

**Issue 1-1-1: Channel model for NTN-TDLC (LOS)**

* Proposals
  + Option 1 (Ericsson, Apple, Nokia, Qualcomm): DS=5ns, Doppler=200Hz. K-factor=8.05dB.
  + Option 2 (Huawei, Nokia): DS=3.5ns, Doppler=200Hz, K-factor=8.05dB.
* Discussion:
  + Nokia: We slightly prefer option 1 even option 2 also feasible.
  + Ericsson: We prefer option 1.
  + Apple: Delay spread (RMS) value as 5ns. We provide the results between 5ns and 3.5ns, no performance degradation observed from UE side. Companies can further check.
  + Huawei: This change will impact SAN side as well which require huge simulation effort. If companies fine to have more evaluation, that’s also acceptable for us.
  + QC: We slightly prefer option 1 for the simplicity of naming. We didn’t observe any performance difference.
* Agreement: option 1 agreed

**Issue 1-1-2: Delay resolution**

* Proposals
  + Option 1 (Ericsson, Qualcomm, Nokia, Apple): Adopt 5 ns as the delay resolution
  + Option 2 (Huawei): Reduce the delay resolution to 2 ns for NTN TDL channel model simplification.
* Discussion:
  + Apple: We support option 1.
  + QC: We share same view as Apple, 5ns delay resolution also used for TN.
  + MTK: We support option 1.
  + Huawei: In Rel-15/17, simplification of channel model adopted with 12 taps remaining. But for NTN channel model, only 2 taps and we think no complexity issue for CE vendors.
* Agreement: Option 1 agreed

**Issue 1-1-3: Delay profile for NTN-TDLA**

* Proposals
  + Option 1 (Ericsson, Qualcomm, Apple): Accept following delay profile. Delay resolution is 5ns

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay [ns]** | **Power [dB]** | **Fading distribution** |
|
| 1 | 0 | 0 | Rayleigh |
| 2 | 110 | -4.675 | Rayleigh |
| 3 | 285 | -6.482 | Rayleigh |

* + Option 2 (Apple): Accept following delay profile. Delay resolution is 5ns

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay** | **Power in [dB]** | **Fading distribution** |
| 1 | 0 | 0 | Rayleigh |
| 2 | 105 | -4.7 | Rayleigh |
| 3 | 280 | -6.5 | Rayleigh |

* Discussion:
  + Huawei: We suggest to round the power values to be aligned with TDL channel.
* Agreement: Delay profile for NTN-TDLA

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay [ns]** | **Power [dB]** | **Fading distribution** |
|
| 1 | 0 | 0 | Rayleigh |
| 2 | 110 | -4.7 | Rayleigh |
| 3 | 285 | -6.5 | Rayleigh |

**Issue 1-1-4: Delay profile for NTN-TDLC**

* Proposals
  + Option 1 (Ericsson, Apple): Accept following delay profile DS=[5ns]

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay [ns]** | **Power [dB]** | **Fading distribution** |
| 1 | 0 | -0.394 | LOS path |
| 0 | -8.668 | Rayleigh |
| 2 | 60 | -21.423 | Rayleigh |
| NOTE: The first tap follows a Rician distribution with a K-factor of K1 = 8.05 dB and a mean power of 0dB. | | | |

* + Option 1a (Nokia):
* The delay profile according to agreements without any quantization of tap delays (resolution change) is as follows:

Using tentative agreement DS=[5 ns]

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay [ns]** | **Power [dB]** | **Fading distribution** |
| 1 | 0 | -0.394 | LOS path |
| 0 | -8.668 | Rayleigh |
| 2 | 60.7480 | -21.423 | Rayleigh |
| NOTE: The first tap follows a Rician distribution with a K-factor of K1 = 8.05 dB and a mean power of 0dB. | | | |

Using tentative agreement DS=[3.5 ns]

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Delay [ns]** | **Power [dB]** | **Fading distribution** |
| 1 | 0 | -0.394 | LOS path |
| 0 | -8.668 | Rayleigh |
| 2 | 42.5236 | -21.423 | Rayleigh |
| NOTE: The first tap follows a Rician distribution with a K-factor of K1 = 8.05 dB and a mean power of 0dB. | | | |

* + Option 1b (Qualcomm): Using tentative agreement DS=[3.5 ns]

Also, looking at 38.811, it does not seem to specifically mention whether 8.05dB (rural, 30-degree elevation) is K-factor of K1, rather it mentions “*K* = Ricean K-factor”, which typically means K-factor with respect to all Rayleigh paths, not just between the Ricean and first Rayleigh path. We encourage other companies to comment on this as well.

|  |  |  |  |
| --- | --- | --- | --- |
| Tap # | Delay [ns] | Power [dB] | Fading distribution |
| 1 | 0 | -0.6322 | LOS path |
| 0 | -8.9062 | Rayleigh |
| 2 | 42.5 | -21.662 | Rayleigh |
| NOTE: The first tap follows a Rician distribution with a K-factor of K1 = 8.05 dB and a mean power of 0dB. | | | |

* + Option 2 (Huawei): Accept following delay profile. Delay resolution is 2ns

|  |  |  |  |
| --- | --- | --- | --- |
| **Tap #** | **Normalized delay** | **Scaled Power in [dB]** | **Fading distribution** |
| 1 | 0 | -0.6024 | LOS path |
| 0 | -8.8768 | Rayleigh |
| 2 | 12.1496 | -21.6318 | Rayleigh |

* Discussion:
  + Huawei: We suggest to normalize first tap as 0 dB.
  + QC: This will impact other taps with normalized power.
  + Apple: Same comments as QC. We see the difference with QC proposed values.
  + Huawei: We suggest to normalize all the taps to ensure first tap with 0dB power. This is following the procedure of the TDL channel specification introduction.
  + Apple: That applied for NLOS channel model.
  + QC: We ensure the mean power across all taps is 0 dB. We suggest to further discuss.

**Issue 2-1: K\_offset value**

* Proposals
  + Option 1 (Nokia, Huawei, Qualcomm, Apple, Ericsson): Confirm K\_offset equal to 8 slots for 15kHz SCS for all the HARQ configurations
  + Option 2: Specify other option if any
* Discussion:
  + Agreement: Option 1 agreed.

**Issue 2-2: Doppler shift for LOS Path in the NTN TDL-C Channel**

* Proposals
  + Option 1 (MTK, Qualcomm): RAN4 define the Doppler shift for the LOS tap in NTN TDL-C channel, considering either fs = 0.7 fd or fs = cos(Ө) \* fd with some specific AoA Ө value, e.g., 60 degrees



* + Option 2 (Nokia, Apple, Ericsson): No need to define fs = 0.7 fd or fs = cos(Ө) \* fd with some specific AoA Ө value

Moderator’s note: Option 2 was agreed as the starting point in last meeting

* Discussion:
  + MTK: We would like to clarify doppler shift for LOS tap which would be useful for simulation.
  + QC: We have similar view as MTK.
  + Apple: In TR 38.901 we shave clarification on the doppler shift of LoS; but for 38.101-5 no such definition. We believe no need to capture this explicitly into 38.101-5.
  + Nokia: We prefer option 2.
  + MTK: We should be clear for that part.
* Agreement:
  + Further clarify the doppler shift for LoS tap, such information can be captured into WF.

**Issue 2-3: Modulation order**

* Proposals
  + Option 1 (Nokia, Apple, Qualcomm, Ericsson, MTK): Do not define PDSCH performance requirements for 64QAM
  + Option 2 (Huawei): Define PDSCH performance requirements for 64QAM
* Discussion:
  + Huawei: The feasibility already confirmed and discussed in RF session.
* Agreement: Do not define PDSCH performance requirements for 64QAM
  + It’s not precluded to discuss and specify requirements for 64QAM in future releases.

**Issue 2-4: SCS/CBW set**

* Proposals
  + Option 1 (Nokia, Apple, Qualcomm, Ericsson, MTK): Do not define requirements with additional 30KHz SCS for NTN
  + Option 2 (Huawei): Define requirements with 30KHz/20MHz SCS/CBW for NTN

Moderator’s note: It has been agreed that 15kHz/10MHz SCS/CBW should be defined.

* Discussion:
  + Huawei: In SAN demodulation discussion, we already agreed to introduce requirements for 30kHz SCS. For the alignment between SAN and UE side, we prefer to specify 30kHz SCS for UE side as well. We already compromised on 64QAM order, hope another camp can offer the compromise.
  + Apple: We didn’t see the deployment scenario on 30kHz SCS in reality for FDD NTN bands.
  + Ericsson: In TN, we only specify 15kHz SCS requirements for UE in FDD bands. We didn’t see the urgent demand on this case which will increase work load.
  + QC: We share similar view as Ericsson. We shall focus on the realistic scenario.
  + Huawei: All rel-17 features are still developing; we should not preclude 30kHz can be used for FDD bands.
  + MTK: We support option 1.
  + Thales: 15kHz is worst case from doppler shift and 30kHz is worst case from time error side. We are worry about the progress and workload.

**Issue 2-5: HARQ configurations**

* Proposals
  + Option 1 (Apple, MTK): Define the PDSCH test cases with the following HARQ configurations

|  |  |  |
| --- | --- | --- |
| 1. **Prop. Channel** | 1. **MCS** | 1. **HARQ Config** |
| 1. NTN-TDLA100-200 | 1. MCS4 | 1. Disabled HARQ |
| 1. MCS13 | 1. 16 HARQ Proc |
| 1. NTN-TDLC5-200 | 1. MCS4 | 1. 32 HARQ Proc |
| 1. MCS13 | 1. 16 HARQ Proc |

* + Option 2 (Qualcomm): Define a PDSCH test with 16 HARQ processes
* Agreement:
  + Define PDSCH test cases for Disabled HARQ, 16 HARQ proc and 32 HARQ processes and further discuss the detailed test cases.

**Conclusions after 2nd round**

**[104-bis-e][318] NR\_NTN\_Demod\_Part2, AI 4.2.7.1, 4.2.7.3– Tricia Li**

**R4-2216902 Email discussion summary for [104-bis-e][318] NR\_NTN\_Demod\_Part2**

*Type: other For: Information  
 Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 11th**

**Issue 1-1-1: Antenna configuration for PUSCH requirements**

* Proposals
  + Option 1 (Nokia, Ericsson, Huawei, Samsung): Keep previous agreement that both 1Rx and 2Rx shall be considered for NTN SAN PUSCH demodulation requirements.
* Agreement: Option 1 agreed

**Issue 1-1-2: Test applicability rule for different antenna configuration for PUSCH requirements**

* Proposals
  + Option 1 (Nokia, Huawei, Samsung, Ericsson): Unless otherwise stated, for a SAN supporting different numbers of antenna connectors (for SAN type 1-C) or TAB connectors (for SAN type 1-H) (see D.xxx in table yyy), the tests with low MIMO correlation level shall apply only for the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.
  + Option 2 (Ericsson, Nokia): Unless otherwise stated, for a SAN supporting different numbers of antenna connectors (for SAN type 1-C) or TAB connectors (for SAN type 1-H) (see D.xxx in table yyy) by same polarization type, the tests with low MIMO correlation level shall apply only for either one connector or the second lowest number of supported connecters, in addition to the highest number of supported connectors, and the specific connectors used for testing are based on manufacturer declaration
* Agreement: Option 1 agreed

**Issue 1-2-1: Antennal configuration for PUCCH requirements**

* Proposals for PUCCH long formats 1, 3 and 4:
  + Option 1 (Nokia, Ericsson, Huawei, Samsung): Consider both 1Rx and 2Rx for SAN PUCCH long formats requirements, i.e. PUCCH format 1 and format 3 and format 4, with same test applicability rule as PUSCH as discussed in Issue 1-1-2 Option 1.
* Proposals for PUCCH short formats 0 and 2:
  + Option 1 (Nokia, Ericsson, Samsung): Consider SAN PUCCH format 0 and format 2 requirements for only 2Rx configuration with NLOS channel. Corresponding manufacture declarations and applicability rules should be further discussed.
  + Option 2 (Ericsson, Nokia): Introduce LOS channel for SAN PUCCH format 0 and 2 demodulation requirements with 1Rx configuration
  + Option 3 (Huawei): Discuss a general rule that if the final derived simulation result is larger than a certain value, such as [10dB], then the corresponding cases can be not defined.
  + Option 4 (Samsung): Consider both **1Rx and 2Rx** for SAN PUCCH format 0 and 2 requirements with **NLOS** channel with same test applicability rule as PUSCH as discussed in Issue 1-1-2 Option 1.
  + Option 5 (Nokia): Option 1 + Option 2, i.e. Consider **1Rx** SAN PUCCH format 0 and 2 requirements with **LOS** channel and **2Rx** SAN PUCCH format 0 and 2 requirements with **NLOS** channel, with same test applicability rule as PUSCH as discussed in Issue 1-1-2 Option 1.
* Discussion:
  + Huawei: We observed 10dB span for the results of format 4.
  + Nokia: We proposed combined option5. Based on the collected results, we can further check by agree with option5 approach at current moment.
  + Samsung: We also support option 1. We don’t prefer to introduce LOS channel here.
  + Ericsson: We suggest to further align the simulation results. If NLOS channel not suitable for 1Rx, then we lost test coverage for 1Rx case with short format. It’s better to consider LOS channel for achievable SNR points.
  + Huawei: We see large span among the results.
* Agreement:
  + PUCCH long formats 1, 3, 4: Option 1 agreed
    - Further align the results for format 4 required
  + PUCCH short formats 0 and 2:
    - Further effort on the alignment of simulation results required
    - Both LOS and NLOS channel can be further evaluated and considered
    - Companies are encouraged to bring more results

**Conclusions after 2nd round**

### 4.3 Extending current NR operation to 71GHz

#### 4.3.3 BS RF requirements maintenance

**R4-2215571 CR to TS 38.104 on reference to FRCs**

*Type: CR For: Agreement  
 38.104 v17.7.0 CR-0411 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Add G-FR2-A1-3, G-FR2-A1-8 and G-FR2-A1-9 to the FR2-2 FRC list in annex A.1.

**Decision:** The document was **not treated**.

**R4-2215832 CR to TS 38.104: Correction of guardband for FR2-2 in sub-clause 5.3.3**

*Type: CR For: Agreement  
 38.104 v17.7.0 CR-0412 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

During review errors related to FR2-2 guardbands for 100 MHz and 400 MHZ carrier bandwidths was discovered. The 120 kHz SCS SU allocation is aligned between FR2-1 and FR2-2, hence the guardband should be equal in the same way as in the UE specification.

**Decision:** The document was **not treated**.

#### 4.3.4 BS RF conformance testing

##### 4.3.4.1 General

**R4-2215572 Proposal on suitability of OTA measurement systems on BS conformance testing for extending current NR operation to 71 GHz**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution discusses the suitability of OTA measurement systems on BS conformance testing for extending current NR operation to 71 GHz based on the agreed WF.

**Decision:** The document was **not treated**.

**R4-2215830 Draft CR to TR 37.941: Addition of aspects related to EIRP measurement in CATR relevant for FR2-2 in sub-clause 7.3, 8.3, 9.2.3 and 9.2.7**

*Type: draftCR For: Endorsement  
 37.941 v17.0.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

When support for FR2-2 is added into the conformance test specification 38.141-2 re-using information relevant for FR2 is seen as the baseline. This draft CR adds relevant aspects related to FR2-2 and measurments of EIRP in CATR in TR 37.941. The technica

**Decision:** The document was **not treated**.

**R4-2215831 On further general aspects relevant for FR2-2 conformance testing**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this contribution we continue the work initiated in [9] to provide input for discussion to resolve general open issues and propose solutions to advance in the discussion with the goal to complete the performance work. In companion contributions [7, 8]

**Decision:** The document was **not treated**.

**R4-2215836 Draft CR to TS 38.141-2: Addition of FR2-2 aspects in clause 4**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR adds support for FR2-2 in TS 38.141-2, clause 4. Information agreed in way-forward R4-2214374 is implemented.

**Decision:** The document was **not treated**.

##### 4.3.4.2 Transmitter characteristics

**R4-2215573 Proposal on measurement uncertainty of BS OTA transmitter requirements for extending current NR operation to 71 GHz**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution proposes an approach to decide the measurement uncertainty of BS OTA transmitter requirements for extending current NR operation to 71 GHz based on the agreed WF.

**Decision:** The document was **not treated**.

**R4-2215828 Draft CR to TS 38.141-2: Addition of FR2-2 transmitter support in clause 6**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR adds support for FR2-2 in TS 38.141-2, clause 6. The test requirements are aligned with RF core requirements in big draft CR R4-2210641 agreed for TS 38.104.

**Decision:** The document was **not treated**.

**R4-2215833 On further aspects related to FR2-2 transmitter conformance testing**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this contribution some additional details related to transmitter conformance testing is presented.

**Decision:** The document was **not treated**.

**R4-2216496 FR2-2 BS conformance test consideration for Tx testing**

*Type: discussion For: Agreement  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

**R4-2216498 FR2-2 Test Model details and TP**

*Type: discussion For: Agreement  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

**R4-2216499 FR2-2 EVM measurement detail and TP**

*Type: discussion For: Agreement  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

**R4-2216560 Further discussion on BS conformance testing for 52.6-71GHz**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

##### 4.3.4.3 Receiver characteristics

**R4-2215574 Proposal on measurement uncertainty of BS OTA receiver requirements for extending current NR operation to 71 GHz**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution proposes an approach to decide the measurement uncertainty of BS OTA receiver requirements for extending current NR operation to 71 GHz based on the agreed WF.

**Decision:** The document was **not treated**.

**R4-2215829 Draft CR to TS 38.141-2: Addition of FR2-2 receiver support in clause 7**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR adds support for FR2-2 in TS 38.141-2, clause 7. The test requirements are aligned with RF core requirements in big draft CR R4-2210641 agreed for TS 38.104.

**Decision:** The document was **not treated**.

**R4-2215834 On further aspects related to FR2-2 receiver conformance testing**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this contribution some additional details related to receiver conformance testing is presented.

**Decision:** The document was **not treated**.

**R4-2216497 FR2-2 BS conformance test consideration for Rx testing**

*Type: discussion For: Agreement  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

#### 4.3.7 Demodulation and CSI requirements

##### 4.3.7.1 General (incl. Channel models)

**R4-2216010 Discussion on general issues for FR2-2 demodulation requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216178 On Demod Requirements for FR2-2 - General**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216179 Draft CR to 38.101-4 for FR2-2 Demod - General section**

*Type: draftCR For: Discussion  
 38.101-4 v17.6.0 CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

##### 4.3.7.2 UE Demodulation and CSI requirements

**R4-2215585 Draft CR for Introducing Propagation channel models for requirements in FR2-2**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215586 Draft CR for Introducing FRCs for requirements in FR2-2**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216011 BigCR: Introduction of FR2-2 UE demodulation and CSI requirements in 38.101-4**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

###### 4.3.7.2.1 PDSCH requirements

**R4-2215532 On PDSCH Requirements for ext71GHz**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution we have provided our views on various open issues with relation to PDSCH requirements for the extension to 71GHz.

**Decision:** The document was **not treated**.

**R4-2215533 PDSCH simulation results for ext71GHz**

*Type: discussion For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2215587 On PDSCH demod requirements for 52.6 - 71 GHz**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215910 The remaining issues of the PDSCH requirements in 52.6 – 71 GHz band**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper, we present our view on the remaining issues of the PDSCH demodulation requirements for FR2-2.

**Decision:** The document was **not treated**.

**R4-2215911 Simulation results for PDSCH demodulation in 52.6 – 71 GHz band**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

In this paper and based on the progress summarized in WF, we present new simulation results on the PDSCH performance in the frequency range 52.6 GHz to 71 GHz

**Decision:** The document was **not treated**.

**R4-2215918 draft CR on PDSCH requirements for 52.6 - 71 GHz band**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Define PDSCH requirements for 52.6 – 71 GHz band

**Decision:** The document was **not treated**.

**R4-2216012 Discussions on FR2-2 PDSCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216013 Simulation results on FR2-2 PDSCH demodulation requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216014 Draft CR: Introduction of FR1+FR2-2 CA PDSCH performance requirements in TS 38.101-4**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216180 Simulation Results for FR2-2 UE Demodulation PDSCH**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

###### 4.3.7.2.2 PDCCH/PBCH requirements

**R4-2215534 On PDCCH and PBCH Requirements for ext71GHz**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2215535 PDCCH and PBCH simulation results for ext71GHz**

*Type: discussion For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution we have provided our views on various open issues with relation to PDCCH and PBCH for the extension to 71GHz.

**Decision:** The document was **not treated**.

**R4-2215536 Nokia\_DraftCR\_38101-4\_PDCCH**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2215588 On PDCCH and PBCH demod requirements for 52.6 - 71 GHz**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215912 The remaining issues for PDCCH and PBCH requirements in FR2-2**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper, we present our view on the remaining issues for PDCCH and PBCH demodulation requirements for FR2-2

**Decision:** The document was **not treated**.

**R4-2215913 Simulation results for PDCCH and PBCH demodulation in FR2-2**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

In this paper, we present the simulation results on the PDCCH and PBCH demodulation performance in the frequency range 52.6 GHz to 71 GHz

**Decision:** The document was **not treated**.

**R4-2216015 Simulation results on FR2-2 PDCCHPBCH requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216181 Simulation Results for FR2-2 UE Demodulation PDCCH/PBCH**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216182 Draft CR to 38.101-4 for FR2-2 Demod - PBCH Requirements**

*Type: draftCR For: Discussion  
 38.101-4 v17.6.0 CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

###### 4.3.7.2.3 SDR requirements

**R4-2215914 SDR requirements in 52.6 – 71 GHz band**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper, we present our view on the SDR requirements for FR2-2

**Decision:** The document was **not treated**.

**R4-2215915 Simulation results for SDR requirements in 52.6 – 71 GHz band**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

In this paper, we present the simulation results to support our view on the SDR requirements in the 52.6 – 71 GHz band

**Decision:** The document was **not treated**.

**R4-2215919 SDR requirements for 52.6 GHz – 71 GHz band.**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

SDR requirements for 52.6 GHz – 71 GHz band.

**Decision:** The document was **not treated**.

**R4-2216016 Discussions on FR2-2 SDR requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216017 Simulation results FR2-2 SDR requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

###### 4.3.7.2.4 CSI reporting requirements

**R4-2215537 On CSI Reporting Requirements for ext71GHz**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution we have provided our views on various open issues with relation to CSI reporting requirements for the extension to 71GHz.

**Decision:** The document was **not treated**.

**R4-2215589 On CQI reporting requirements for 52.6 - 71 GHz**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215590 Draft CR for Introducing CSI reporting requirements for 52.6 - 71 GHz**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215916 CSI reporting requirements in 52.6 – 71 GHz band**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper, we present our view on the CSI reporting requirements in 52.5 GHz – 71 GHz band, where the related aspects have been gathered in the WF

**Decision:** The document was **not treated**.

**R4-2215917 Simulation results for CSI reporting requirements in FR2-2**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

In this paper and based on the progress summarized in WF, we present the simulation results on the CSI reporting which has been limited CQI reporting under static conditions in the frequency range 52.6 GHz to 71 GHz.

**Decision:** The document was **not treated**.

**R4-2216018 Discussion on remaining issues on FR2-2 CQI requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216019 Simulation results on FR2-2 CQI requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216183 Discussion on FR2-2 CQI Requirements**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216707 CSI Simulation Results for ext71GHz**

*Type: discussion For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

##### 4.3.7.3 BS demodulation requirements

###### 4.3.7.3.1 PUSCH requirements

**R4-2215690 Discussion on general and PUSCH issue for FR2-2 BS demodualtion**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

discussion on remianing open issues

**Decision:** The document was **not treated**.

**R4-2215691 Simulation results for FR2-2 PUSCH**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2215694 draftCR for TS38.104 introduce FRC tables for FR2-2 PUSCH requirements**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introduce FRC tables for FR2-2 PUSCH demodulation requirements

**Decision:** The document was **not treated**.

**R4-2215695 draftCR for TS38.141-2 introduce FRC tables for FR2-2 PUSCH requirements**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

introduce FRC tables for FR2-2 PUSCH demodulation requirements

**Decision:** The document was **not treated**.

**R4-2216020 Draft CR: Introduction of FR2-2 PUSCH radiated conformance testing requirements in TS 38.141-2**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216021 Discussions on FR2-2 PUSCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216022 Simulation results on FR2-2 PUSCH demodulation requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216570 Discussion on PUSCH demodulation requirements for the extension to 71 GHz**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216571 PUSCH simulation results for the extension to 71 GHz**

*Type: other For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216691 View on BS demodulation requirement for NR extended to 71GHz**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216694 Initial simulation results on PUSCH demodulation requirement for Rel-17 71GHz**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

###### 4.3.7.3.2 PUCCH requirements

**R4-2215692 Simulation results for FR2-2 PUCCH**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2216023 Discussions and simulation results on FR2-2 PUCCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216024 Draft CR Introduction of FR2-2 PUCCH performance requirements in TS 38.104**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216572 Discussion on PUCCH demodulation requirements for the extension to 71 GHz**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216573 PUCCH simulation results for the extension to 71 GHz**

*Type: other For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216695 Initial simulation results on PUCCH demodulation requirement for Rel-17 71GHz**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

###### 4.3.7.3.3 PRACH requirements

**R4-2215693 Simulation results for FR2-2 PRACH**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2216025 Discussions on FR2-2 PRACH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216026 Simulation results on FR2-2 PRACH demodulation requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216574 Discussion on PRACH demodulation requirements for the extension to 71 GHz**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216575 PRACH simulation results for demodulation requirements for the extension to 71 GHz**

*Type: other For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216576 Draft CR 38.104: PRACH requirements for FR2-2**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216577 Draft CR 38.141-2: PRACH requirements for FR2-2**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216692 Draft CR on annex for PRACH requirement for TS 38.104**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216693 Draft CR on annex for PRACH requirement for TS 38.141-2**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216696 Initial simulation results on PRACH demodulation requirement for Rel-17 71GHz**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

#### 4.3.8 Moderator summary and conclusions

**[104-bis-e][306] NR\_exto71GHz\_BSRF, AI 4.3.3,4.3.4– Michal Szydelko**

**R4-2216890 Email discussion summary for** [**104-bis-e][306] NR\_exto71GHz\_BSRF**

*Type: other For: Information  
 Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 12th**

**Sub-topic 1-1: Total power dynamic range**

* Proposals:
  + Option 1: For FR2-2 define minimum requirement for total power dynamic range as described in Table 2-2 (R4-2215833, Ericsson)

Table 2-2: Minimum requirement for total power dynamic range in FR2-2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SCS | OTA total power dynamic range (dB) | | | | |
| (kHz) | 100 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
| 120 | 17.7 | 23.8 | N/A | N/A | N/A |
| 480 | N/A | 17.7 | 20.8 | 23.8 | N/A |
| 960 | N/A | 14.7 | 17.7 | 20.8 | 21.5 |

* + Option 2: other (specify why not Option 1).
* Agreement: Option 1 agreed

**Sub-topic 1-2: EVM**

* Proposals (non-exclusive):
  + Option 1: In test model general parameters (in TS38.141-2, clause 4.9.2.2), duration is currently described as 2 radio frames for TDD while 10 ms as measurement interval on EVM. For FR2-2, this should be twice of [80] slots in time length to ensure actual slots with DL signal can be preperad more than [80] slots measurement inverval for EVM (R4-2216498, Keysight)
  + Option 2: In test model data content clause (in TS38.141-2, clause 4.9.2.3), PN23 to be reset at the beginning of every [80] slots time period for FR2-2 instead every one frame for FR1/FR2-1. For remaining slots in frame, same data to be repeated every 80 slots time period (R4-2216498, Keysight)
  + Option 3: to propose update the Annex L for FR2-2 EVM measurement (R4-2216560, ZTE)
  + Option 4: other (specify why not Options listed above)
* GTW discussion:
  + ZTE: We are fine with Keysight proposal. The motivation of option 1,2 and option 3 is different.
  + Keysight: We also agree to update annex L.
* Agreement: Option 1 and option 2 agreed as baseline and further work on the details in corresponding draft TP.

**Sub-topic 1-3: Rx OOB blocking**

* Proposals (non-exclusive):
  + Option 1: For FR2-2 adopt the interferer signal step size description in Table 2-3 into TS 38.141-2. (R4-2215834, Ericsson)

Table 2-3: Interferer signal step size for FR2-2

|  |  |  |
| --- | --- | --- |
| Frequency range  (MHz) | Minimum supported *BS channel bandwidth* (MHz) | Measurement  step size  (MHz) |
| 30 to 6000 | 100, 400, 800, 1600, 2000 | 1 |
| 6000 to 142000 | 100 | 30 |
|  | 400 | 60 |
|  | 800 | 240 |
|  | 1600 | 240 |
|  | 2000 | 240 |

* + Option 2: Regarding with Rx test feasibility, due to practical point of view (preparing and swapping/re-calibrating bandpass filter), maximum OOB blocking interferer frequency to be limited at 110 GHz (R4-2216497, Keysight)
  + Option 3: other (specify why not Options listed above)
* GTW discussion:
  + Ericsson: In previous meeting, the upper limit 142GHz agreed with [ ].
  + Keysight: We are fine to further check the upper limit.
* Agreement:
  + For step size, option 1 agreed
  + For upper frequency limit ([142] GHz), companies are encouraged to further check.

**Sub-topic 2-1: MU**

* Proposals (some are non-exclusive)
  + Option 1: For FR2-2 follow MU evaluation approach described in TR 37.941, sub-clause 5.2 (R4-2215831, Ericsson)
  + Option 2: To allow additional 0.3 dB measurement uncertainty of BS OTA transmitter requirements in FR2-2 compared to the existing ones for the frequency range (43.5 GHz < f ≤ 48.2 GHz), except the 5.0 dB uncertainty value for transmitter spurious emissions which should be able to cover up to 71 GHz (R4-2215573, Nokia)
  + Option 3 (R4-2216496/ R4-2216497 for Tx and Rx, Keysight)
    - Total test system MU calculation principle described in TR37.941, which is based on the ISO Guide on Evaluation of measurement dat document, should be continuously used and existing MU budget table should be used for 71GHz extention MU calculation.
    - Calibration procedure assure defined and calculated MU, which doesn’t improve MU. Swithcing to Type A evaluation is not practical. (note, Type A evaluation means, use measured result (calibration results) to estimate MU. In this case, calbration procedure in test procedure is to measure some test system characteristic such as loss etc. Use of such results for MU estimation requires enough and many amount of measured results under various conditions. Which is not practical). In short, calibration procedure/method arrangement doesn’t improve system MU.
  + Option 4: An approach to decide the MU of BS OTA RX requirements (R4-2215574, Nokia)
    - Step 1) Decide the measurement uncertainty for OTA receiver requirements in FR2-2 is to identify the uncertainty values for the existing components in FR2-1 (current candidates include RF signal generator and network analyzer) that need to be updated notably in FR2-2, assuming the uncertainty values for the other components in FR2-1 in clause 10.2 of TR 37.941 can be reused in FR2-2.
    - Step 2) Decide the measurement uncertainty for OTA receiver requirements in FR2-2 is to decide the additional components (current candidates include mixer and power sensor/meter) and the corresponding uncertainty values.
    - Step 3) Calculate the measurement uncertainty for receiver sensitivity in FR2-2 from the measurement uncertainty for receiver sensitivity in FR2-1 by updating the uncertainty values of the components decided in step 1 as well as adding the uncertainty values of the components decided in step 2 in the corresponding tables in clause 10.2 of TR 37.941.
    - Step 4) Calculate the measurement uncertainty for other receiver requirements in FR2-2 from the measurement uncertainty for receiver sensitivity in FR2-2 using the corresponding formula in clauses 10 and 12 of TR 37.941.
  + Option 5: MUs for measurement equipment at higher frequencies should reflect the use of calibrated composite test equipment. (R4-2215831, Ericsson)
* GTW discussion:

Issue 1: General principle

* + Nokia: We are fine with option 1, the concern is timeline. First, we list the components which need to be updated, then we can finalize the MU values based on the list.
  + Keysight: We prefer to follow option 1 which the procedures we followed to derive the MU values. The proposed values from option 2 is too small which not acceptable for us.
  + Ericsson: We have similar view as Nokia for the timeline. It’s better to generate a table.
  + Nokia: At least we need to generate the list and aims to conclude in next meeting with values.
  + Ericsson: We support the ideal from Nokia.
  + Keysight: It’s not feasible to conclude MU values in this meeting, we agree the proposed approach from Nokia.

Issue 2: Calibration procedure

* + Nokia: In existing TR, calibration procedure also specified; we can update the information if needed; but the key issue is MU values in the end.
  + Ericsson: We think MU on some of common test components can be maintained for high frequency. Using power meter together with spectrum analyzer can be used to improve absolute power accuracy. To improve the calibration procedure can be helpful to have a reasonable MU.
  + Keysight: Additional components will contribute additional MU as well. Power meter maybe not feasible for some of cases due to the limited power dynamic range.
  + Nokia: Power meter already considered in existing TR for FR2-1.
  + Ericsson: Power meter didn’t take into account for MU calculation.
  + Keysight: Power meter usage shall be considered as optional.
  + Huawei: We have similar discussion for 47GHz.
  + Ericsson: We can consider the details further.
* Agreement:
* For FR2-2 follow MU evaluation approach described in TR 37.941, sub-clause 5.2 in principle
  + Target to generate a list for the components (which can be maintained and which need to be updated) by this meeting
  + TE vendors feedback is encouraged
* Whether additional calibration procedure can be considered subject to companies’ further input, RAN4 shall focus on the MU values based on companies’ individual input.

**Sub-topic 2-4: Test equipment MU**

* Proposals:
  + Option 1: We propose to consider MU values for common test equipment in Table 2.4-1 and Table 2.4-2 as baseline for FR2-2 MU evaluation work (R4-2215831, Ericsson)

**Table 2.4-1: Standard test equipment measurement uncertainty defined for FR2-1**

|  | **Measurement uncertainty**  **(dB)** | | |
| --- | --- | --- | --- |
| **Test equipment** | **3 < f < 26 (GHz)** | **37 < f < 43.5 (GHz)** | **43.5 < f < 60 (GHz)** |
| Vector Network Analyzer (VNA) | 0.20 (Note 1) | 0.30 | 0.30 |
| Spectrum/Signal Analyzer (SA), Power Meter (PM) | 0.20 to 0.37 (Note 1) | 0.70 | 0.60 |
| Signal Generator (SG) | 0.46 (Note 2) | 0.90 | Not defined |
| Note 1: Values used for FR2-1 MU evaluation in TR 37.941.  Note 2: Values used for FR1 MU evaluation in TR 37.941. | | | |

**Table 2.4-2: Standard test equipment standard uncertainty (1 sigma) required for FR2-2**

| **Test equipment** | **60 < f < 71 GHz**  **(dB)** | **71 GHz< f ≤ 142 GHz**  **(dB)** |
| --- | --- | --- |
| Vector Network Analyzer (VNA) | 0.40 | 1.00 |
| Spectrum/Signal Analyzer (SA) | 0.70 | 1.20 |
| Power Meter (PM) | 0.30 | 0.50 |
| Signal Generator (SG) | 1.20 | 1.50 |

* Option 2: For power measurement equipment MU up to 80 GHz for spurious measurement, following two are option and agree with one of these (R4-2216496, Keysight)
  + With respect to previously agreed values, and as compromise, use 2.33 as 1-sigma value from 40 GHz to 60 GHz, use 2.0 as 1-sigma value from 60 GHz t0 80 GHz.
  + Use 2.33 as 1-sigma value to extend to from 40 GHz to 80 GHz for spurious measurement power measurement equipment number, this is to keep using the same value already used in TR37.941
* Option 3: For test equipment MU value for other measurement case (such as ACP, Tx Off power), we should agree 1st on use of existing principle in TR37.941 first (in proposal-2) and existing MU budget table before discuss these numbers (R4-2216496, Keysight)
* Option 4: For network analyser MU value, previously used value up to 60 GHz for TR 37.941 is actually too small and challenging. However, while it’s already used in existing MU calculation, propose following as compromise for BS test system setup. Up to 60 GHz, use 0.30 (as 1-sigma value), for 60 GHz ~ 80 GHz use 0.85 (as 1-sigmal value) (R4-2216496, Keysight)
* GTW discussion:
  + Keysight: We need to check each parameters case by case if they can maintain same values as FR2-1.
  + Huawei: It’s better to separate discussion of MU for common components, and calibration procedure.
  + Nokia: In Ericsson proposal, we didn’t see MU for additional component of up/down converters.
  + Ericsson: In our paper we provide the analysis to consider the MU can be considered together with common test requirements.
  + Keysight: Mixer already used for existing specification for 60GHz. Two types of mixed existing, dedicated mixer with spectrum analyzer and another type not controlled by spectrum analyzer.
  + Nokia: Can be combined MU of power meter into RF power measurement?
  + Ericsson: We suggest to separate MU for power meter.
  + Keysight: We think mismatch term also need to be considered.
* Agreement:
  + Using Table 2.4-1 from TR 37.941 as baseline to collect MU values from companies for common test equipment.
    - Including parameters VNA, SA, PM, SG and/or RF power measurement
  + FFS whether mismatch term can be considered and how to be reflected into MU budget

**Sub-topic 3-1: OTA chambers**

* Proposals (non-exclusive):
  + Option 1: The suitability of using Near Field Test Range and Plane Wave Synthesizer for BS type 2-O testing in the frequency range between 52.6GHz and 71GHz should be studied and confirmed by TE vendors, or the list of OTA measurement system set-ups should be updated for each BS type 2-O testing in the frequency range between 52.6GHz and 71GHz (R4-2215572, Nokia)
  + Option 2 (R4-2216496, Keysight)
    - CATR is applicable for 71 GHz extension test case up to 142 GHz spurious measurement. CATR system should be designed to cover device antenna size and pathloss for this much frequency.
    - Define 142 GHz as max frequency of spurious measurement
  + Option 3: CATR is applicable for Receiver testing on 71 GHz extension receiver testing. Use of power amplifier needs to be assumed (R4-2216497, Keysight)
  + Option 4: other (specify why not Options above).
* GTW discussion:
  + Nokia: The applciable table, there are 7 types in the TR and in the TS, only 5 adopted.
  + Ercisson: We have misalignment between TR and TS. A WF can be generated to continue the work.
  + Huawei: We are fine to the proposed approach with Ericsson. We can take option 1,2,3 input into account for the conclusion and discussion.
* Agreement:
  + Using the applciable table in TR 37.941 as baseline to further discuss the applicable test medthods. A WF can be consdiered to trigger 2nd round discussion.
    - The techinial analysis shall be provided and confirmed for the applciable test methods.
    - The confirmed test methods can be included into the appliable tables.

**Conclusions after 2nd round**

**[104-bis-e][319] NR\_exto71GHz\_Demod\_Part1, AI 4.3.7.1, 4.3.7.3– Rafael Paiva**

**R4-2216903 Email discussion summary for [104-bis-e][319] NR\_exto71GHz\_Demod\_Part1**

*Type: other For: Information  
 Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on October 11th**

**Issue 1-1-1: SCS for demodulation requirements**

* Proposals
  + Option 1: RAN4 do not consider 960kHz SCS for FR2-2 BS demodulation requirements. (Ericsson, Samsung)
  + Option 2: Consider 120 kHz, 480 kHz and 960 kHz SCS for FR2-2 BS demodulation requirements (Nokia)
* Discussion:
  + Nokia: We still prefer to include 960kHz SCS. For sake of progress, we can accept option 1 in Rel-17.
* Agreement: RAN4 agree to focus on 120kHz and 480kHz SCSs for introducing FR2-2 BS demodulation requirements in Rel-17.

**Issue 2-1-2: Channel bandwidth for PUSCH requirements with 120 kHz SCS**

* Proposals
  + Option 1: 120 kHz SCS with 100 MHz (Samsung, Huawei)
  + Option 2: 120 kHz SCS with 100 MHz and 400 MHz (Nokia, Ericsson)
* Discussion:
  + Huawei: We support option 1. From receiver baseband processing perspective, no big difference. We also worry about the test feasibility considering link-budget.
  + Nokia: Wide channel bandwidth shall be verified as well. In RF session, the test feasibility already be confirmed.
  + Ericsson: We agree with option 2. 400MHz is mandatory for 120kHz SCS, for FR2-2 larger channel bandwidth more practical. With larger channel bandwidth, baseband processing more complicated with PN.
  + Samsung: We think 100MHz can serve test purpose. Meanwhile we are also open to consider 400Mhz if OTA test feasibility can be confirmed.
  + Huawei: We are wondering whether to specify two mandatory channel bandwidths.
  + Nokia: Does mean we only introduce 400MHz test cases or introducing test applicable rules among 100MHz and 400MHz?
  + Huawei: We only introduce 400MHz CHBW if feasibility.
  + Ericsson: We prefer to specify requirements for both minimum CHBW and maximum CHBW if feasible and then consider test applicable rules.
  + Huawei: Both 400MHz and 100MHz are mandatory for BS.
  + Nokia: BS only verified under maximum CHBW BS declared to be supported.
* Agreement: 120kHz SCS with 100MHz and/or [400MHz]
  + 400MHz introduction pending on further confirmation of the test feasibility
  + Further discuss test applicable rules considering the mandatory CHBW sets for BS

**Issue 2-1-3: Channel bandwidth for PUSCH requirements with 480 kHz SCS**

* Proposals
  + Option 1: 480 kHz SCS with 400 MHz (Samsung, Ericsson, Huawei)
  + Option 2: 480 kHz SCS with 400 MHz and 1600 MHz (Nokia, 800MHz also can be considered to replace 1600MHz)
* Discussion:
  + Nokia: We suggest to consider wide channel bandwidths.
  + Huawei: 480kHz is optional feature from UE side, we prefer to specify 400MHz only which is mandatory.
  + Ericsson: We share same view as Huawei.
  + Samsung: We support option 1 with same view as Huawei.
  + Nokia: Even larger CHWB is optional, still some UEs can be supported. We already compromised in large SCS on 960kHz.
* Agreement: For 480kHz SCS at least 400MHz
  + FFS for 800MHz and/or 1600MHz
    - Test applicable rules can be considered if larger CHBW introduced besides 400MHz

**Issue 3-2-1: DMRs configuration for PUCCH format 3**

* Proposals
  + Proposal 1: RAN4 to align DRMS configuration of PUCH format 3 in FR2-2 with the existing configuration for FR2-1. (Ericsson, Nokia, Samsung)
  + Proposal 2: Adopt DRMS configuration 1+1 and 1+0 for PUCCH format 3 with 14 OFDM symbols. (Nokia, Samsung)
  + Proposal 3: Adopt DRMS configuration 1+1 for PUCCH format 3 with 4 OFDM symbols.
  + Proposal 3a: Adopt DRMS configuration 1+0 for PUCCH format 3 with 4 OFDM symbols. (Nokia, Samsung)
* Discussion:
  + Huawei: We share same view as Nokia and Samsung.
* Agreement:
  + RAN4 to align DRMS configuration of PUCH format 3 in FR2-2 with the existing configuration for FR2-1.
    - Adopt DRMS configuration 1+1 and 1+0 for PUCCH format 3 with 14 OFDM symbols.
    - Adopt DRMS configuration 1+0 for PUCCH format 3 with 4 OFDM symbols.

**Issue 4-1-2: Channel model for PRACH requirements**

* Proposals:
  + Option 1: RAN4 to define PRACH demodulation requirements using AWGN and TDL-A 30-650 channel model for 120 kHz SCS and using AWGN and TDL-A 10-650 channel model for other SCSs. (Nokia, Ericsson, Huawei)
  + Option 2: Keep the PRACH agreement with AWGN and TDL-A 10-650 for all SCSs. (Samsung)
* Discussion:
  + Huawei: We support option 1.
  + Samsung: We still prefer option 2.
  + Nokia: We prefer option 1, with option 2, the delay resolution would be problematic for 120kHz SCS case.
  + Ericsson: We prefer option 1 to be aligned with PUCCH and PUSCH cases.
* Tentative agreement: Option 1.

**Issue 4-2-1: PRACH time error tolerance general aspects**

* Proposals
  + Proposal 1: Not to define time error tolerance that is smaller than the minimum possible step for the timing advance command.
  + Proposal 2: Reuse calculation of PRACH time error tolerance for fading channel from Rel 15 and Rel 16 as the AWGN tolerance combined with the second last tap used for the requirement.
* Discussion:
  + Nokia: We are fine with the equation as Ericsson mentioned. We think no performance impact with 2nd last tap approach.
* Agreement:
  + Proposal 1 agreed
  + Reuse calculation of PRACH time error tolerance for fading channel from Rel 15 and Rel 16

**Conclusions after 2nd round**

**[104-bis-e][320] NR\_exto71GHz\_Demod\_Part2, AI 4.3.7.2– Pierpaolo Vallese**

**R4-2216904 Email discussion summary for [104-bis-e][320] NR\_exto71GHz\_Demod\_Part2**

*Type: other For: Information  
 Source: Moderator (Qualcomm)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 11th**

**Issue 1-1-3: Whether to introduce requirements with 960kHz SCS**

* Proposals
  + Option 1: Yes, for CBW=400MHz (Nokia);
  + Option 2: No, deprioritize 960kHz (Ericsson, QC, Huawei);
* Discussion:
  + Nokia: Based on updated SNR ranges, it’s feasible to verify SCS 960 kHz.
  + QC: We support option 2. From testable SNR range, it’s feasible. But we still prefer not considering 960kHz SCS in Rel-17 given the workload and timeline.
  + Ericsson: We support option 2.
  + Huawei: We support option 2 considering workload in Rel-17.
  + Nokia: We think 960kHz is feasible and important feature meanwhile we can comprise to not specify performance requirements in Rel-17 given the feedback from other companies.
* Agreement: RAN4 focus on 120kHz and 480kHz SCS for introducing UE demodulation requirements in FR2-2.
  + It’s not precluded to discuss and introduce requirements for 960kHz SCS in future releases.

**Issue 1-1-5: Whether to introduce requirements with 400MHz CBW for 120kHz SCS for single CC**

* Proposals
  + Option 1: Yes, at least one requirement for lower MCS and with reduced RB allocation (Nokia);
  + Option 2: No (Ericsson);
* Discussion:
  + Nokia: With updated testable SNR range, 400MHz is feasible for low MCS and we should cover 400MHz at least for one test case.
  + QC: We prefer not to include 400MHz. From baseband processing aspect, no difference among 400MHz and 100MHz.
  + Apple: We didn’t see the benefits with reduced MCS and RB allocation and no processing different compared to 100MHz.
  + Huawei: We share same view with QC and Apple. Larger BW with reduced RB allocation is similar with small CHBW; for CA there is difference according to RF requirements; we proposed to introduce requirements for 400MHz CHBW.
  + Nokia: For 400MHz CHBW, we think it’s feasible to verify with full RB allocation. Even with reduced RB allocation, we still observe the difference.
  + Huawei: In Rel-15, we choose one typical CHBW to introduce performance requirements. It’s not meaningful to introduce multiple channel bandwidths.
  + QC: We share the value from Huawei. With larger CHBW, PN maybe impacted but with low MSC, there is no impact with PN.
  + Apple: We share similar view as Huawei and QC.
  + Nokia: We would like to check whether 400MHz is mandatory or not. We can consider test applicable rules if introduced.

**Issue 1-2-2: Whether to schedule PDSCH in slots that contain TRS symbols during PDSCH testing**

* Proposals
  + Option 1: No (Qualcomm);
  + Option 2: TBA
* Discussion:
  + Huawei: The PRB allocations of TRS can be same as scheduled PDSCH.
  + QC: We typically not configure BWP part for performance requirements.
  + Ericsson: We support option 1.
  + Apple: With option 1, what’s the BW assumption for TRS? This may be impacted the SNR set-up. Option 1 fine for us.
  + QC: Either with full BW or minimum BW for TRS transmission.
  + Huawei: BWP always configured in common table of performance requirements part in the specifications.

**Issue 1-3-3: For PDSCH Requirements for 120kHz/100Mhz, Propagation Channels:**

* Proposals
  + Option 1: TDLA30-200, TDLA30-650, TDLD30-200 (Ericsson, Apple);
  + Option 2: TDLA30-200, TDLA30-650, TDLD10-200; (Nokia)
  + Option 3: TDLA30-200, TDLD30-200 (Huawei);
  + Option 4: TDLA30-650, TDLD30-650 (Qualcomm);
* Recommended WF
  + Consider TDLD10 not applicable for 120kHz/100MHz according to the Channel models agreements from RAN4#104-e;
  + To guarantee coverage and considering SNR limitations, discuss whether the following compromise is agreeable for the definition of PDSCH requirements:
    - TDLA30-650 for MCS 4;
    - TDLA30-200 for MCS 13;
    - TDLD30-200 for MCS 17 and above;
* Discussion:
  + Nokia: We are ok to TDL channels, for MCS selections we need more time to further discuss.
  + QC: We suggest to list tentative agreement to ease simulation effort.
  + Ericsson: We think TDL30-650 for MCS 4 and 13. And Leave TDLD30-200 for MCS 17 and above if introduced.
  + Apple: We support the recommended WF.
  + Huawei: We support the recommended WF.
* Tentative agreement: Pending on further checking on the simulation results.
  + TDLA30-650 for MCS 4;
  + TDLA30-200 for MCS 13;
  + TDLD30-200 for MCS 17 and above;

**Issue 1-3-4: For PDSCH Requirements for 480kHz/400Mhz, Propagation Channels:**

* Proposals
  + Option 1: TDLA10-200, TDLD10-200 (Ericsson, Nokia, Huawei);
  + Option 1: TDLA10-200 (Apple);
  + Option 3: TDLA10-650, TDLD10-200 (Qualcomm);
* Recommended WF
  + To guarantee coverage and considering SNR limitations, discuss whether the following compromise is agreeable for the definition of PDSCH requirements:
    - TDLA10-200 for MCS 4;
    - TDLD10-200 for MCS 13 and above;
* Discussion:
  + Ericsson: We are fine with the recommended WF.
* Agreement: For PDSCH Requirements for 480kHz/400Mhz: following channel model adopted
  + TDLA10-200 for MCS 4;
  + TDLD10-200 for MCS 13 and above;

**Issue 1-6-1: Whether to define PDSCH requirements with 30% of peak throughput**

* Proposals
  + Option 1: Yes, for 400MHz/480kHz (Nokia);
  + Option 2: Yes, for 120kHz and 480(Ericsson);
  + Option 3: Deprioritize (Huawei, Apple, QC);
* Discussion:
  + Nokia: FR2-2 is separate to FR2-1, we would like to introduce requirements with 30% for FR2-2 as well.
  + QC: We support option 3 considering the workload.
  + Apple: We should focus on test cases with 70%.
  + Huawei: We prefer to deprioritize 30% case.
  + Ericsson: We can change one of existing test cases for both 120kHz and 480kHz with 30% instead of 70%.
  + Huawei: We suggest to consider high MCS.
* Agreement:
  + Add one test case for 120kHz case only with 30% peak throughput.

**Issue 3-1-1: Whether to introduce SDR Test for FR2-2 in Rel. 17**

* Proposals
  + Option 1: Yes (Huawei)
  + Option 2: No (Ericsson, Apple, QC);
* Discussion:
  + Huawei: We understand SDR pending the available testable SNR range. We faced similar issue in FR2-1. We can’t preclude more advanced TE implementation introduced in the future.
* Agreement: Not define SDR test for FR2-2 in Rel-17
  + It’s not precluded to further discuss in future releases.

**Conclusions after 2nd round**

### 4.4 NR coverage enhancements

#### 4.4.2 BS demodulation requirements

**R4-2215643 Simulation results collection for coverage enhancement for PUCCH**

*Type: discussion For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Simulation results for PUCCH JCE

**Decision:** The document was **not treated**.

##### 4.4.2.1 PUSCH requirements

**R4-2215325 Summary of simulation results for PUSCH coverage enhancements**

*Type: discussion For: Information  
 Source: China Telecom*

**Decision:** The document was **not treated**.

**R4-2215326 On BS PUSCH demodulation requirements for NR coverage enhancements**

*Type: discussion For: Discussion  
 Source: China Telecom*

**Decision:** The document was **not treated**.

**R4-2215327 Draft CR on PUSCH with DMRS bundling BS performance test for FR1**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: China Telecom*

**Decision:** The document was **not treated**.

**R4-2215328 Draft CR on PUSCH with DMRS bundling BS performance test for FR2**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: China Telecom*

**Decision:** The document was **not treated**.

**R4-2215638 PUSCH demodulation performance of Rel-17 NR coverage enhancements**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution, we have provided parameters to test PUSCH enhancements performance.

**Decision:** The document was **not treated**.

**R4-2215639 PUSCH demodulation performance of Rel-17 NR coverage enhancements: simulation results**

*Type: discussion For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution, we have provided simulation results parameters for PUSCH enhancements performance.

**Decision:** The document was **not treated**.

**R4-2215640 draftCR for 38.104: FRC for TBoMS and PUSCH JCE**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

FRC for TBoMS FR1 and FR2 with 5PRBs allocated

FRC for FR2 PUSCH JCE requirements

FRC for FR1 may be further updated once the agreement on CHBW and DM-RS configuration are reached.

**Decision:** The document was **not treated**.

**R4-2215685 draftCR for TS38.104 PUSCH with JCE for FR1 and FR2**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draft CR for introducing PUSCH with JCE requirements

**Decision:** The document was **not treated**.

**R4-2215688 Simulation results for PUSCH with TBoMS and JCE**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2215995 Discussion on BS coverage enhancement demod PUSCH**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215996 Simulation results on BS coverage enhancement demod PUSCH**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215997 Draft CR on requirements for PUSCH TBoMS (TS38.104, Rel-17)**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215998 Draft CR on requirements for PUSCH TBoMS (TS38.141-1, Rel-17)**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2215999 Draft CR on requirements for PUSCH TBoMS (TS38.141-2, Rel-17)**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216686 Simulation results for PUSCH demodulation requirement for Rel-17 coverage enhancement**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216689 Draft CR on FRC for TBoMS and PUSCH JCE for TS 38.141-1**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216690 Draft CR on FRC for TBoMS and PUSCH JCE for TS 38.141-2**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

##### 4.4.2.2 PUCCH requirements

**R4-2215641 draftCR for 38.141-1: Perf requirements for PUCCH JCE**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Cover requirements for PUCCH JCE format 1 and format 3.

**Decision:** The document was **not treated**.

**R4-2215642 draftCR for 38.141-2: Perf requirements for PUCCH JCE**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Cover requirements for PUCCH JCE format 1 and format 3.

**Decision:** The document was **not treated**.

**R4-2215686 draftCR for TS38.141-1 manufacture declaration, applicability rule, MU and TT**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draft CR for introducing general declaration, applicability rule for NR coverage enhancement

**Decision:** The document was **not treated**.

**R4-2215687 draftCR for TS38.141-2 manufacture declaration, applicability rule, MU and TT**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draft CR for introducing general declaration, applicability rule for NR coverage enhancement

**Decision:** The document was **not treated**.

**R4-2215689 Simulation results for PUCCH with JCE**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2216000 Discussion on BS coverage enhancement demod PUCCH**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216001 Simulation results on BS coverage enhancement demod PUCCH**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216507 PUCCH demodulation performance of Rel-17 NR coverage enhancements: simulation results**

*Type: discussion For: Information  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution, we have provided parameters to test PUSCH enhancements performance.

**Decision:** The document was **not treated**.

**R4-2216687 Simulation results for PUCCH demodulation requirement for Rel-17 coverage enhancement**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216688 Draft CR on PUCCH JCE requirements for TS 38.104**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

#### 4.4.3 Moderator summary and conclusions

**[104-bis-e][321] NR\_cov\_enh\_Demod, AI 4.4.3– Jingzhou Wu**

**R4-2216905 Email discussion summary for [104-bis-e][321] NR\_cov\_enh\_Demod**

*Type: other For: Information  
 Source: Moderator (China Telecom)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 13th**

**Issue 1-1: SNR requirement value deriving rule for PUSCH and PUCCH BS demod requirements**

* Proposals:
  + Option 1: Reuse the SNR requirement value deriving rule for Rel-15 BS demodulation SNR requirement derivation procedure in R4-1904713 as below (CTC, HW):

|  |
| --- |
| ***Procedure to derive the performance requirements:***  *– Only inputs that consist of a pair of ideal and impaired results can be taken into account.*  *– If the ideal span <= [2]dB:*  *• The AVERAGE impairment results can be used for the performance requirement with [] in the draftCRs/CRs;*  *– Else if the ideal span is larger than [2]dB:*  *• The results farthest from the AVERAGE value is taken out for the AVERAGE and SPAN re-calculation until the ideal span is <=2dB but still with at least 3 companies’ results available:*  *– The ultimate AVERAGE impairment results with corresponding ideal span <=2dB can be used for performance requirement with [] in the draftCRs/CRs.*  *• Otherwise put TBD for the related performance requirements.*  *– If the span of the impairment results after removal the outliers (if any) are larger than 4dB, then the procedure cannot be applied, related performance requirement remain TBD.* |

* Agreement: Option 1 agreed

**Issue 1-2: Number of HARQ process for BS PUSCH demod requirements with JCE**

* Proposals:
  + Option 1: Not to specify the number of HARQ process (CTC, HW, Samsung)
* Agreement: Option 1 agreed

**Conclusions after 2nd round**

### 4.5 Further enhancements on MIMO for NR

#### 4.5.3 UE Demodulation and CSI requirements

**R4-2215728 Simulation results summary for FeMIMO demodulation and CSI requirement**

*Type: other For: Information  
 Source: Samsung*

**Decision:** The document was **not treated**.

##### 4.5.3.1 Demodulation requirements

**R4-2215538 Draft CR for 38\_101-4 FeMIMO Applicability of Requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

###### 4.5.3.1.1 Enhancement on HST-SFN scenario

**R4-2215595 On demod requirements for HST Scheme-A**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215596 Draft CR on PDSCH requirement for HST-SFN scheme A**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215713 Updated simulation results for HST-SFN**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision:** The document was **not treated**.

**R4-2215726 Discussion and simulation results on demodulation requirement for Enhancement on HST-SFN scenario**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2215882 Views on HST-SFN Tests**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2215886 Simulation Results on HST-SFN Scheme A**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2217284 (from R4-2215886).**

**R4-2217284 Simulation Results on HST-SFN Scheme A**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2215887 Simulation Results on HST-SFN Scheme B**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2217285 (from R4-2215887).**

**R4-2217285 Simulation Results on HST-SFN Scheme B**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2215938 Discussion on demodulation requirement for Enhancement on HST-SFN deployment**

*Type: discussion For: Discussion  
 Source: MediaTek inc.*

**Decision:** The document was **not treated**.

**R4-2216002 Discussion on UE FeMIMO demod HST-SFN**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216003 Simulation results on UE FeMIMO demod HST-SFN**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216004 Draft CR on PDSCH requirement for HST-SFN scheme B**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216387 Discussion on the PDSCH requirement for HST-SFN**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution gives our views on MCS selection of scheme A.

**Decision:** The document was **not treated**.

**R4-2216388 Simulation restuls for PDSCH requirement for HST-SFN**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

This contribution provides simulation results for PDSCH under HST-SFN channel for both Scheme A and scheme B.

Results for scheme A contain results of MCS17 and MCS13.

**Decision:** The document was **not treated**.

###### 4.5.3.1.2 Enhancement on Multi-TRP

**R4-2215597 On PDCCH demod requirements for multi-TRP**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215727 Draft CR on PMI requirement for multi-TRP**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2215874 Simulation Results on Multi-TRP PDCCH Tests**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2217286 (from R4-2215874).**

**R4-2217286 Simulation Results on Multi-TRP PDCCH Tests**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2215876 Views on Performance Requirements for Multi-TRP PDCCH Tests**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2215939 Discussion on demodulation performance requirements definition for Rel17 multi-TRP**

*Type: discussion For: Discussion  
 Source: MediaTek inc.*

**Decision:** The document was **not treated**.

**R4-2216005 Discussion on UE FeMIMO demod mTRP**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216006 Simulation results on UE FeMIMO demod mTRP**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216391 Discussion on the requirement of PDCCH enhancement for Multi-TRP**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the possible additional margin added to the results

**Decision:** The document was **not treated**.

**R4-2216392 Simulation results for PDCCH enhancement for Multi-TRP**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

This contribution provides simluation results for PDCCH repetition with FDD 2Rx, 4Rx and TDD 2Rx, 4Rx for both with and without soft-combining.

**Decision:** The document was **not treated**.

**R4-2216393 draft CR to 38.101-4: PDCCH requirement with inter-slot repetition**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR brings PDCCH requirements for multi-TRP

**Decision:** The document was **not treated**.

**R4-2216790 Draft CR on reference measurement channels for multi-TRP PDCCH performance**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

##### 4.5.3.2 CSI requirements

**R4-2216007 Discussion on UE FeMIMO CSI mTRP**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216008 Simulation results on UE FeMIMO CSI mTRP**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216389 Discussion on the gamma value for PMI reporting tests for Multi-TRP**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the gamma value for PMI reporting tests

**Decision:** The document was **not treated**.

**R4-2216390 Simulation results for PMI reporting tests for Multi-TRP**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

This contribution provides simulation results for PMI reporting of 8x2, 8x4 for both FDD and TDD.

**Decision:** The document was **not treated**.

#### 4.5.4 Moderator summary and conclusions

**[104-bis-e][322] NR\_FeMIMO\_Demod, AI 4.5.3– Yunchuan Yang**

**R4-2216906 Email discussion summary for [104-bis-e][322] NR\_FeMIMO\_Demod**

*Type: other For: Information  
 Source: Moderator (Samsung)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 13th**

**Issue 1-1-1: additional margin requirement for multi-TRP repetition transmission**

* Proposals
  + Option 1 (Apple):
    - Define the requirements with an extra margin based on the span in results due to different receiver assumption.
  + Option 2 (Qualcomm, Ericsson, MTK, Apple): 1 dB
    - Ericsson: More results from different companies are needed. Consider an additional 1dB margin to be added on top of alignment results if the performance gap between the best result of ‘with soft-combining’ and the worst result of ‘without soft-combining’ is larger than 3dB but less than 4dB.
    - MTK: We support to define PDCCH requirement for multi-TRP repetition transmission scheme with high enough additional margin to support all UE implementation assumptions.
  + Option 3 (Huawei):
    - The decision of how much margin to be added should be based on the latest simulation results provided by companies in this meeting. No addition margin should be considered if the simulation results are well aligned.
* Recommended WF
  + - Method 1: Check the available results across with and without soft-combing

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Duplex | Tx/RX | HW  （w） | MTK  wo | MTK  w | Apple  (w) | QC(wo) | E///  (w) | E///  (wo) | Gap (w) | Gap (w0) | Gap(w wo) |
| FDD | 2x2 | -1.71 | 1.03 | -0.59 | -1.4 | 0.32 | -2.3 | -0.8 | 1.71 | 1.83 | -3.33 |
| FDD | 2x4 | -5.78 | -2.93 | -4.50 | -5.2 | -3.52 | -6.1 | -4.6 | 1.6 | 1.67 | -3.17 |
| TDD | 2x2 | -1.37 | 1.15 | -0.43 | -1.2 | 1.48 | -2.3 | -0.9 | 1.87 | 2.38 | -3.78 |
| TDD | 2x4 | -5.73 | -2.89 | -4.40 | -4.8 | -2.95 | -6.2 | -5.0 | 1.8 | 2.11 | -3.31 |

* + - Method 2: Check results without soft-combing if companies provide results for both with and without soft-combing

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Qualcomm | Huawei | Ericsson | MTK (W/O) | Apple | Average | Span | STD |
| 0.32 | -1.71 | -2.3 | 1.03 | -1.40 | -0.51 | 2.74 | 1.04 |
| -3.52 | -5.78 | -6.1 | -2.93 | -5.20 | -4.41 | 2.85 | 1.05 |
| 1.48 | -1.37 | -2.3 | 1.15 | -1.20 | -0.17 | 2.85 | 1.22 |
| -2.95 | -5.73 | -6.2 | -2.89 | -4.80 | -4.27 | 2.84 | 1.15 |

* + - Additional margin
      * Option 1 (MTK, Samsung, Ericsson, Apple?): [1] dB based on method 1
      * Option 2 (Huawei, Nokia): [0.5] dB based on method 2
      * Option 3 (QC): [2] dB
* Discussion:
  + QC: We would like to check how many companies provide results without soft-combing.
  + Huawei: Currently the span is larger than 2.5dB, then 0.5dB can be reasonable assumption.
  + Apple: Do we plan to specify receiver assumption? We don’t see the issue to derive the requirements based on existing tables. The results typically span is 2.5dB as upper bound; currently the span is little over 2.5dB, we think it’s reasonable approach to specify requirements in receiver agonistic way.
  + Ericsson: We are fine with method 2/option2 also. The margin can be discussed later.
  + QC: We don’t prefer method 2.
  + Apple: All the results submitted from companies shall be considered and companies can declare which results they prefer to consider for deriving results if multiple results submitted. The we can consider extra margin.
  + MTK: We can confirm we prefer without soft combination.
  + Huawei: We can fine the new proposal from Apple.
  + Ericsson: We prefer to consider with soft combining results.
* Agreement:
  + Choose the results to derive the requirements based on the companies’ declaration of which results need to be taken into account when multiple results submitted from companies
  + The additional margin can be further discussed based the collected results

**Issue 2-1-1: MCS for HST-SFN scheme A**

* Proposals
  + Option 1 (MTK, Qualcomm, Apple, Ericsson, Samsung): MCS 13 for both FDD and TDD
  + Option 2 (Samsung)
    - TDD: MCS 13
    - FDD: MCS 17
  + Option 3 (Huawei): MCS 17 for both FDD and TDD
* Discussion：
  + Huawei: From our results, MCS 17 can achieve peak data rate. If MCS 13 selected, we didn’t observe the gain with previous transmission scheme for HST SFN deployment.
  + Apple: We specify RAN4 requirements following RAN1 design. Performance gain evaluation out of RAN4 scope.
* Agreement: Introduce HST-SFN scheme A with MCS 13 for both FDD and TDD

**Issue 2-1-2: MCS for HST-SFN scheme B**

* Proposals
  + Option 1 (MTK, Apple, QC, Samsung): same as HST-SFN scheme A with MCS 13
  + Option 2 (Samsung)
    - TDD: MCS 13
    - FDD: MCS 17
  + Option 3 (Ericsson, Huawei, DCM): MCS 17
* Discussion:
  + Ericsson: With our results, we can see the peak data rate can be reached for scheme B with MCS 17. And we already agreed MCS 17 as baseline.
  + QC: From our internal evaluation, MCS 17 can’t reach peak data for scheme B.
  + Huawei: We share similar view as Ericsson. MCS 17 can achieve peak data with scheme B.
  + Samsung: We have similar observation as QC, peak data can’t reach with MCS 17 even with scheme B.
* Agreement: Introduce HST-SFN scheme B with MCS 13 for both FDD and TDD

**Issue 2-1-3: Test applicability rule for scheme A and scheme B**

* Proposals
  + Option 1 (Agreement in the last meeting, Samsung, QC, MTK, DCM, CMCC, Apple, HW (compromised)): [If UE support HST-SFN scheme A and pass the test of HST SFN scheme A, it can skip the test of HST SFN scheme B]
  + Option 2 (Huawei):
    - For the test applicability rule, test different UE feature with different SCS, i.e. test HST-SFN scheme A for 15kHz and HST-SFN scheme B for 30kHz if UE support both HST SFN schemes.
* Agreement: Option 1

**Issue 3-1-1: Gamma value**

* Proposals
  + Option 1 (Agreement in the last meeting, Huawei): [1.6]
  + Option 2 (Ericsson):

|  |  |  |
| --- | --- | --- |
|  | TP ratio (following Type I PMI /random Type I PMI) | Proposed Gamma value |
| FDD, 2Rx | 2.36 | 1.6 |
| FDD, 4Rx | 2.82 | 2.1 |
| TDD, 2Rx | 2.92 | 2.2 |
| TDD, 4Rx | 3.12 | 2.4 |

* Agreement: Keep the gamma value with [1.6] into draftCR.

**Conclusions after 2nd round**

### 4.6 Support of reduced capability NR devices

#### 4.6.5 UE demodulation and CSI requirements

##### 4.6.5.1 Demodulation requirements

###### 4.6.5.1.1 PDSCH/SDR requirements

**R4-2215625 Discussion on PDSCH/SDR requirements in RedCap**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215628 Draft CR PDSCH demodulation requirements for RedCap**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216027 Simulation results on RedCap PDSCH requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216028 Draft CR: Corrections of RedCap SDR requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216175 Simulation Results for Redcap UE Demodulation PDSCH**

*Type: discussion For: Information  
 Source: Qualcomm Incorporated*

**Abstract:**

RedCap UE Demodulation Results for PDSCH

**Decision:** The document was **not treated**.

**R4-2216221 Simulation results for Redcap PDSCH**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216230 draft CR: Correction of RedCap UE demodulation requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR corrects the RedCap UE demodulation requirements

**Decision:** The document was **not treated**.

**R4-2216232 Open issues on UE demodulation requirements for RedCap**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the open issues on UE demodulation requirements for RedCap UE.

**Decision:** The document was **not treated**.

**R4-2216234 Summary of simulation results for RedCap**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

This spread sheet summarizes the simulation results for RedCap UE demodulation requirements.

**Decision:** The document was **not treated**.

###### 4.6.5.1.2 PDCCH/PBCH requirements

**R4-2216176 Simulation Results for Redcap UE Demodulation PDCCH/PBCH**

*Type: discussion For: Information  
 Source: Qualcomm Incorporated*

**Abstract:**

RedCap UE Demodulation Results for PDCCH/PBCH

**Decision:** The document was **not treated**.

**R4-2216222 Simulation results for Redcap PDCCH**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216223 Simulation results for Redcap PBCH**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

##### 4.6.5.2 CSI requirements

###### 4.6.5.2.1 CQI requirements

**R4-2215626 Discussion on CQI requirements in RedCap**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216029 Simulation results on RedCap CQI requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216030 Discussion on remaining issues on RedCap CQI requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216177 RedCap UE Demodulation Requirements CQI**

*Type: discussion For: Discussion  
 Source: Qualcomm Incorporated*

**Abstract:**

Discussion on RedCap UE Demodulation requirements for CQI/PMI/RI

**Decision:** The document was **not treated**.

**R4-2216224 Simulation results for RedCap CQI reporting**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216225 Draft CR 38.101-4 Finalization of channel quality reporting requirements under static condition for RedCap**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216231 draft CR: Correction of RedCap CSI reporting requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR corrects the RedCap CSI reporting requirements

**Decision:** The document was **not treated**.

**R4-2216233 Open issues on CSI reporting requirements for RedCap**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the open issues on CSI reporting requirements for RedCap

**Decision:** The document was **not treated**.

**R4-2216429 draftCR for RedCap UE Demodulation Requirements CQI for static channel**

*Type: draftCR For: Discussion  
 38.101-4 v17.6.0 CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216703 Discussion on CQI requirements for RedCap**

*Type: discussion For: Discussion  
 Source: MediaTek inc.*

**Decision:** The document was **not treated**.

###### 4.6.5.2.2 PMI/RI requirements

**R4-2215627 Discussion on PMI/RI requirements in RedCap**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216031 Simulation results on RedCap RI requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216032 Discussion on remaining issues on RedCap RI requirements**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216033 Draft CR: Corrections of RedCap PMI requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216226 Draft CR 38.101-4 Finalization of Rank Indicator reporting requirements for RedCap**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216704 Discussion on PMIRI requirements for RedCap**

*Type: discussion For: Discussion  
 Source: MediaTek inc.*

**Decision:** The document was **not treated**.

**R4-2216706 Draft CR to TS38.101-4, Corrections to ReCap PMI requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v17.6.0 CR- rev Cat: F (Rel-17)  
  
 Source: MediaTek inc.*

**Decision:** The document was **not treated**.

#### 4.6.6 Moderator summary and conclusions

**[104-bis-e][323] NR\_RedCap\_Demod, AI 4.6.5– Kazuyoshi Uesaka**

**R4-2216907 Email discussion summary for [104-bis-e][323] NR\_RedCap\_Demod**

*Type: other For: Information  
 Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 13th**

**Issue 2-1-1: CQI feedback scheduling pattern in static/fading condition (periodic CSI reporting) for both FD-FDD and HD-FDD**

**Issue 2-3-2: CQI/RI/PMI reporting delay for RI reporting tests for FDD 15kHz**

**Way forward from the last meeting:** Interested companies are encouraged to evaluate the performance difference between CQI delay 14ms and 10ms in RAN4#104-bis-e. If significant performance degradation is observed compared with CQI delay 10ms, RAN4 will revisit the CQI/RI/PMI delay.

* Proposals
  + Option 1 (Apple, Ericsson, Huawei):
    - CSI-RS periodicity and offset: **10/1**
    - CSI-Report periodicity and offset: 10/9
    - CQI/RI/PMI delay: **14ms**
  + Option 2 (MediaTek):
    - CSI-RS periodicity and offset: **10/5**
    - CSI-Report periodicity and offset: 10/9
    - CQI/RI/PMI delay: **10ms**
* Discussion:
  + MTK: During legacy test cases for FDD, TDD; 8ms/9.5ms adopted. 10ms more close legacy set-up.
* Agreement: Option 2 agreed

**Issue 2-1-2: Static channel matrix used for 1Rx UE and SNR test points for CQI reporting tests**

**Way forward from the last meeting:** Interested companies are encouraged to evaluate the options for the static channel matrix and SNR test point offset.

* Proposals
  + Option 1 (Qualcomm):
    - Set the static channel matrix in the frequency domain as .
    - Set the same SNR test point for both 1Rx and 2Rx UE, that is, SNR=8/9dB and SNR=14/15dB.
  + Option 2 (Huawei):
    - Set the static channel matrix in the frequency domain as .
    - Set SNR test point X=3dB lower than 2Rx test case, that is, SNR=5/6dB and SNR=11/12dB.
* Discussion:
  + QC: Option 1 matched with 2Rx which is our preference. For sake of progress, we can accept option 2 if companies have strong preference.
  + Huawei: We think both option 1 and option 2 workable. Option 2 is previous RAN4 agreement.
* Agreement: Option 2 agreed.

**Conclusions after 2nd round**

### 4.7 Enhanced IIoT and URLLC support

#### 4.7.3 Demodulation performance and CSI requirements

##### 4.7.3.1 PUCCH requirements

**R4-2215543 Sub-slot based PUCCH repetition performance requirements**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution we have discssed the last remaining issue of KPI selction for sub-slot based PUCCH repetition performance requirements.

**Decision:** The document was **not treated**.

**R4-2215544 Simulation Results on Sub-slot based PUCCH repetition**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

In this contribution we have provided our simulation results for Sub-slot based PUCCH repetition.

**Decision:** The document was **not treated**.

**R4-2215545 Draft CR for TS 38.104 Demod performance requirement for sub-slot repetition PUCCH format 0 (Rel-17, CAT B)**

*Type: draftCR For: Endorsement  
 38.104 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Added conducted and Type 1-O minimum performance reuqirment section for sub-slot repetition PUCCH format 0.

Both ACK MD and DTX to ACK requirements are introduced

**Decision:** The document was **not treated**.

**R4-2215696 Simulation results for PUCCH sub-slot repetition**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

simulation results

**Decision:** The document was **not treated**.

**R4-2216034 Simulation results and discussion on remaining issues on Rel-17 URLLC PF0 subslot repetition requirments**

*Type: discussion For: Discussion  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216035 Draft CR: Introduction of manufacturer declarations for sub-slot repetition PF0 requirements**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216036 Draft CR: Introduction of applicability rules for sub-slot repetition PF0 requirements**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216037 Simulation summary of sub-slot repetition PF0 requirements**

*Type: other For: Information  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216700 Discussion and simulation results for Enhanced IIOT and URLLC support**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216701 Big CR on requirement for Enhanced IIOT and URLLC for TS 38.141-2**

*Type: CR For: Agreement  
 38.141-2 v17.7.0 CR-0426 rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216702 Draft CR on OTA performance requirements for PUCCH for TS 38.141-2**

*Type: draftCR For: Endorsement  
 38.141-2 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2217283 draftCR for TS38.141-1 general and PUCCH demodulation requirements for URLLC IIoT enhancement**

*Type: draftCR For: Endorsement  
 38.141-1 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

#### 4.7.4 Moderator summary and conclusions

**[104-bis-e][324] NR\_IIOT\_URLLC\_enh\_Demod, AI 4.7.3– Axel Muller**

**R4-2216908 Email discussion summary for [104-bis-e][324] NR\_IIOT\_URLLC\_enh\_Demod**

*Type: other For: Information  
 Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 13th**

**Issue 1-1-1: Remaining KPIs**

* Proposals
  + Option 1 (Nokia, Huawei, Samsung): Define the performance requirements for Prob(ACK miss)<1%, in addition to Prob(DTX to ACK)<1%.
  + Option 2: Other options not precluded.
* Agreement: Option 1 agreed.

**Issue 1-2-1: Applicability rule**

* Proposals
  + Option 1 (Huawei): Unless otherwise stated, PUCCH sub-slot based repetition tests shall apply only if the BS supports it (see D.1XX in table [manufacturer declarations]).
  + Option 2 (Ericsson): Applicability of requirements for sub-slot based PUCCH repetition:  
    Unless otherwise stated, sub-slot based PUCCH repetition requirement tests shall apply only if the BS supports it (see D.xxx in table [manufacturer declarations]).
  + Option 3 (Samsung): Unless otherwise stated, PUCCH sub-slot based repetition requirement tests shall apply only if the BS supports it (see D.1XX in table [manufacturer declarations]).
* Agreement: Option 3 agreed

**Issue 1-2-2: Manufacturer declaration**

* Options:

o             Option 1 (Huawei):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| D.1XX | PUCCH format 0 sub-slot based repetition | Declaration of supported PUCCH format 0 sub-slot based repetition. | c | x | n/a |

o             Option 2 (Ericsson):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.xxx | Sub-slot based PUCCH/PUCCH sub-slot based repetition formats | Declaration of support sub-slot based PUCCH repetition formats, i.e., format 0. | x | x |

o             Option 3 (Samsung):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.xxx | Sub-slot based PUCCH repetition formats | Declaration of support sub-slot based PUCCH repetition formats, ~~i.e., format 0.~~ | x | x |

* Discussion:
  + Huawei: We support option 2 since we only specify requirements for format 0.
  + Samsung: We are ok with option 2. Sub-slot based on repetition and PUCCH format are separate features. Even we only verify PUCCH format 0, for other format it should be similar.
  + Nokia: We support option 3 as Huawei and Samsung mentioned. Sub-slot based repetition applicable for all PUCCH formats; with option 1/2 seems only related to format 0.
  + Ericsson: We are fine with option 3.
* Agreement:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.xxx | PUCCH sub-slot based repetition formats | Declaration of PUCCH sub-slot based repetition formats, ~~i.e., format 0.~~ | x | x |

**Conclusions after 2nd round**

## 6 Rel-18 non-spectrum related work items and study items for NR

### 6.4 Study on NR BS RF requirement evolution

#### 6.4.1 General and work plan

**R4-2215575 Proposals on definition of FR2 multi-band BS**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution provides investigation on current FR1 definition of multi-band RIB and proposals on definition of FR2 multi-band BS according to the agreed WF.

**Decision:** The document was **not treated**.

**R4-2216241 TP for deployment scenarios**

*Type: pCR For: Agreement  
 38.877 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

#### 6.4.2 Investigation of mmWave multi-band BS

**R4-2215413 General consideration on mmWave multi-band BS**

*Type: other For: Approval  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215576 Discussion on possible issues on performance of wideband RF and antenna architectures**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution provides investigation on feasibility of FR2 multi-band BS, focusing on the feasibility of multi-band RIB w.r.t. different band combinations.

**Decision:** The document was **not treated**.

**R4-2215768 FR2 Multi-band BS**

*Type: discussion For: Discussion  
 Source: Murata Manufacturing Co Ltd.*

**Decision:** The document was **withdrawn**.

**R4-2216240 Definition of FR2 multi-band BS**

*Type: other For: Approval  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216242 Discussion of mmWave multi-band BS feasibility**

*Type: other For: Approval  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216243 Study on the FR1 multi-band methods**

*Type: discussion For: Discussion  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216397 TP to TR 38.877: NR mm wave BS**

*Type: pCR For: Approval  
 38.877 v0.0.0 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

Observations on mm wave BS

**Decision:** The document was **not treated**.

**R4-2216551 Further discussion on FR2 multi-band operation**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 6.4.3 Moderator summary and conclusions

**[104-bis-e][307] FS\_NR\_BS\_RF\_evo, AI 6.4– Liehai Liu**

**R4-2216891 Email discussion summary for [104-bis-e][307] FS\_NR\_BS\_RF\_evo**

*Type: other For: Information  
 Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 14th**

**Issue 1-3: Definition of multi-band BS**

* Agreement: Option 1 agreed

**Issue 2-1: RF front-end**

* Agreement: RAN4 reached consensus on below observations:
  + **Observation 1**: Multi-band beamformer IC with common active RF components with 19.5% FBW in frequency range 24-29 GHz which includes n257/n258/n261 is feasible.
  + **Observation 5:** For RF front-end, commercially available TRX chips cover 24-29.5GHz. 27-41GHz RX is implemented. A harmonic-selection technique is proposed to extend the receiver’s operating bandwidth up to 24.25-71GHz.

**Issue 2-2: Antenna array**

Agreement: RAN4 reached consensus on below observation

* + **Observation 1**: Multi-band AA (Antenna Array) with common radiated element with 19.5% FBW in frequency range 24-29 GHz which includes n257/n258/n261, or with 26.3% FBW in frequency range 37-48 GHz which includes n260/n259/n262 is feasible at least from antenna array aspect; other aspects FFS

**Issue 2-3: Phase shifters**

* Agreement: RAN4 reached consensus on below observations:
  + Multi-band frequency selective phase shifter might not be soon commercially available but should not excluded specifically at this stage
  + Multiple single band frequency selective phase shifter with common PA is possible while the impact to requirements/performance need further study.

**Issue 2-4: Frequency ranges/groups**

* Agreement: The maximum supported bandwidth and the combinations of supported band combinations/groups for FR2 multi-band RIB may be defined based on the feasibility study.

**Issue 1-1: Scenarios**

* Agreement:
  + Scenarios 1), 4), 5) and 6) should be considered as the target scenarios to be studied in this SI while no study needed on the scenario 2) and 3)

**Conclusions after 2nd round**

### 6.5 Study on NR FR2 OTA testing enhancements

#### 6.5.1 General and work plan

#### 6.5.2 Test methods for RF/RRM/Demodulation requirements

**R4-2215540 Testing Considerations for Multi AoA UE RF Spherical Coverage Test Case and FR2 Demodulation**

*Type: discussion For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

**R4-2215658 On FR2 OTA test methodology enhancements**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215703 Discussion on full degree of rotation freedom with 2AoA**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2215711 Views on FR2-1 RF OTA test for a device with multi-panel reception (2)**

*Type: discussion For: Discussion  
 Source: Anritsu Corporation*

**Abstract:**

In this contribution we show our views to each candidate option at sub-topic 2-1, issue 2-1-4 in the WF (R4-2214357)

**Decision:** The document was **not treated**.

**R4-2216079 Discussion on Test methods**

*Type: discussion For: Approval  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216114 Discussion on FR2 OTA test methods for multi-Rx**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216169 on the FR2 OTA Test method**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216415 Discussion on test methodology for FR2 UE with multi-Rx**

*Type: discussion For: Approval  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216450 Views on FR2 OTA enhanced test method**

*Type: discussion For: Approval  
 Source: OPPO*

**Decision:** The document was **not treated**.

**R4-2216642 Discussion on FR2 methods for UEs with multi-panel reception**

*Type: discussion For: Endorsement  
 38.871 v CR- rev Cat: (Rel-18)  
  
 Source: ROHDE & SCHWARZ*

**Decision:** The document was **not treated**.

#### 6.5.3 Test uncertainty assessments

**R4-2216078 Discussion on MU impacts for Multi-Rx test system**

*Type: discussion For: Approval  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216755 On QoQZ Validation and MU for Multi-AoA Systems for Multi-Chain Operation**

*Type: discussion For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

#### 6.5.4 Moderator summary and conclusions

**[104-bis-e][325] FS\_NR\_FR2\_OTA\_enh, AI 6.5– Bin Han**

**R4-2216909 Email discussion summary for [104-bis-e][325] FS\_NR\_FR2\_OTA\_enh**

*Type: other For: Information  
 Source: Moderator (Qualcomm)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

### 6.13 Air-to-ground network for NR

#### 6.13.4 BS RF requirements

**R4-2215414 General consideration on BS RF core requirements for ATG network for NR**

*Type: other For: Approval  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215508 ATG BS classes, types and requirements**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision:** The document was **not treated**.

**R4-2216052 Discussion on ATG BS type**

*Type: other For: Approval  
 Source: Huawei, Hisilicon*

**Decision:** The document was **not treated**.

**R4-2216053 TP for TR 38.876**

*Type: other For: Approval  
 Source: Huawei, Hisilicon*

**Decision:** The document was **not treated**.

**R4-2216400 ATG BS requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Proposals for remaining BS issues

**Decision:** The document was **not treated**.

**R4-2216540 Further discussion on ATG BS RF requirements**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 6.13.6 Moderator summary and conclusions

**[104-bis-e][308] NR\_ATG\_BSRF, AI 6.13.4– Wubin Zhou**

**R4-2216892 Email discussion summary for [104-bis-e][308] NR\_ATG\_BSRF**

*Type: other For: Information  
 Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 13th**

**Issue 1-1: Typical vertical altitude range [TBD km] for ATG scenarios with a ground BS to air UE**

* Proposals
  + Option 1: 9.5-12km (CATT)
  + Option 2: 7-12km (CMCC)
  + Option 3: other, please specify
* GTW discussion:
  + Ericsson: Regulation allow WIFI usage over airplane with 3km above. It’s better to be aligned with regulation (Satellite vs 3GPP tech). We would like to see the technical justification whether 3km feasible or not based on co-existence study.
  + CMCC: The altitude range corresponding to typical deployment ATG scenario. We would like to clarify the purpose on this?
  + Nokia: We have similar understanding as Ericsson, but also fine with option 2.
  + Huawei: We prefer option 2, ATG only serve CPE over airplane during cruise altitude range which option 2 more suitable.
  + QC: We have similar view as Huawei, ATG only serve CPE over airplane cruise. But for the altitude, we would like to further check the technical.
  + ZTE: We can wait for the co-existence study. The ratio of 3km during whole flight route should be quite low.
* Agreement:
  + Typical vertical altitude as [3/7] -12 km
  + Further check the feasibility of supporting 3km based on co-existence study

**Issue 1-2: Whether or not to include BS type 1-C?**

* Proposal:
  + Option 1: Yes (CATT, CMCC, Huawei)
  + Option 2: No (Ericsson, ZTE)
* GTW discussion:
  + ZTE: We are fine to include BS type 1-C but we don’t think this is not practical scenario for ATG deployment. And from co-existence study, we will not consider passive antenna assumption. The requirements shall be based on type 1-H and applied for 1-C if applicable.
  + Nokia: Our preference is not including type 1-C and fine consider if other companies see the demand.
  + Huawei: We support type 1-C to allow implementation flexible.
* Agreement: Include BS type 1-C with the assumption that no additional work on co-existence study

**Issue 1-3-1: Whether or not to support 256QAM?**

* Proposal:
  + Option 1: Yes (CMCC, Ericsson, ZTE)
  + Option 2: No, please provide reasons.

**Issue 1-3-2: EVM value for 256QAM**

* Proposal:
  + Option 1: 3.5% (CMCC, ZTE)
  + Option 2: No, please provide reasons.
* Agreement: 256QAM is supported and EVM value for 256QAM equals to 3.5%.

**Issue 1-4-1: Descriptions for the ATG BS class**

* Proposals in R4-2216400:
  + Proposal 1 Confirm the following description for the ATG BS class: “ATG Base Stations are characterized by requirements derived from ATG scenarios with a ground BS to air UE with typical vertical altitude range [TBD km]”
  + Proposal 2 Consider adding a note after the class definition that ATG BS requirements are, unless otherwise stated, the same as WA BS requirements.
* Agreement:
  + ATG Base Stations are characterized by requirements derived from ATG scenarios with a ground BS to air UE with typical vertical altitude range [TBD km]
    - Note: Further refinement on the text proposal to TS related to altitude range not precluded

**Issue 1-4-2: Whether or not to remove Rx IM requirement?**

* Proposal:
  + Option 1: Yes
  + Option 2: No, please provide reasons.
* Discussion:
  + ZTE: We already agreement in previous meeting, no Rx IM requirements since no such surrounding BS close ATG BS.
  + Huawei: We agree with Ericsson to include Rx IM requirements to guarantee receiver linearity.
  + Ericsson: It’s useful to keep the requirements for receiver linearity. If introduced, the same requirements of WA BS class can be applied.
  + CMCC: We should first consider the scenario whether ATG and TN BS will be co-located; if not this requirement shall be excluded.
  + QC: QC support Ericsson proposal.
  + CMCC: We have an assumption of 30 dB MCL between BS on existing requirements, for ATG not sure whether such assumption still valid or not.
  + Ericsson: IM requirements not co-location requirements, we have other aspects considered.
  + ZTE: 30dB MCL is used for Tx IM, not for Rx IM.
* Agreement: FFS whether Rx IM requirements needed or not; if introduced, baseline assumption is existing WA BS class requirements can be reused.

**Conclusions after 2nd round**

### 6.14 Enhancement of TRP and TRS requirements and test methodologies

#### 6.14.1 General and work plan

**R4-2215323 On the work scope of CA and RedCap**

*Type: discussion For: (not specified)  
 Source: Huawei Tech.(UK) Co.. Ltd*

**Decision:** The document was **not treated**.

**R4-2215656 On TRP TRS requirement development prioritization**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216103 Workplan of Rel-18 TRP TRS WI**

*Type: Work Plan For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216104 TR 38.870 Skeleton for enhanced TRP TRS test methods**

*Type: draft TR For: Approval  
 38.870 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216105 LS on 3GPP NR TRP TRS OTA requirements**

*Type: LS out For: Approval  
 to ETSI MSG TFES, GCF CAG, GCF PAG, CTIA Certification, GSMA TSG-AP, NGMN Alliance, PTCRB, CCSA TC9 WG1, cc 3GPP RAN Plenary, 3GPP RAN5  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216473 General views on Rel-18 TRP TRS OTA WI**

*Type: discussion For: Approval  
 Source: CAICT*

**Decision:** The document was **not treated**.

#### 6.14.2 Enhancement of test methodology

##### 6.14.2.1 Anechoic chamber test methodology

**R4-2215324 On TRP Measurement under TxD**

*Type: discussion For: (not specified)  
 Source: Huawei Tech.(UK) Co.. Ltd*

**Decision:** The document was **not treated**.

**R4-2215653 On TRP TRS methodology enhancements**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215654 LS on the availability of wrist phantoms for OTA testing of wearable devices**

*Type: LS out For: Approval  
 to CTIA OTA WG, CTIA OTA Near Field Phantom WG  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215704 Initial discussion of TRP TRS on NR 2Tx UE**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216106 Discussion on Anechoic Chamber test methodology**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216172 on the Anechoic chamber test methodology**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216414 Discussion on enhancement of UE TRP and TRS**

*Type: discussion For: Approval  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216446 Considerations on TRPTRS test methodology for 2Tx UE**

*Type: discussion For: Approval  
 Source: OPPO*

**Decision:** The document was **not treated**.

##### 6.14.2.2 Reverberation chamber test methodology

**R4-2215322 on test methodology for reverberation chambers**

*Type: discussion For: (not specified)  
 Source: Huawei Tech.(UK) Co.. Ltd*

**Decision:** The document was **not treated**.

**R4-2215655 On reverberation chamber harmonization with the reference methodology**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216107 Discussion on Reverberation Chamber test methodology**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216173 on the Reverberation chamber test methodology**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216447 For reverberation chamber test methodology**

*Type: discussion For: Approval  
 Source: OPPO*

**Decision:** The document was **not treated**.

##### 6.14.2.3 MU assessment

**R4-2215320 MU for Reverberation Chambers and BHH**

*Type: discussion For: Agreement  
 Source: Huawei Tech.(UK) Co.. Ltd*

**Abstract:**

MU value proposals for RC and BHH

**Decision:** The document was **not treated**.

**R4-2216108 Discussion on MU work management**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216110 LS to RAN5 on MU work of Rel-18 FR1 TRP TRS WI**

*Type: LS out For: Approval  
 to RAN5  
 Source: vivo*

**Decision:** The document was **not treated**.

##### 6.14.2.4 Testing time reduction

**R4-2215539 Test Time Reduction using Coarser TRP/TRS Measurement Grids**

*Type: discussion For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

**R4-2216109 Views on testing time reduction methodologies**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

#### 6.14.3 Moderator summary and conclusions

**[104-bis-e][326] NR\_FR1\_TRP\_TRS\_enh, AI 6.14– Ruixin Wang**

**R4-2216910 Email discussion summary for [104-bis-e][326] NR\_FR1\_TRP\_TRS\_enh**

*Type: other For: Information  
 Source: Moderator (vivo)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

### 6.15 Enhancement of Multiple Input Multiple Output Over-the-Air test methodology and requirements for NR UEs

#### 6.15.1 General and work plan

**R4-2215542 On FR2 Requirements Framework and Correlation between Simulations and Measurements**

*Type: discussion For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision:** The document was **not treated**.

**R4-2216357 Work plan for Rel-18 NR MIMO OTA WI**

*Type: Work Plan For: Approval  
 Source: CAICT*

**Decision:** The document was **not treated**.

#### 6.15.2 FR2 MIMO OTA test methodology enhancement

**R4-2215657 On FR2 MIMO OTA test methodology enhancement**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2216077 Discussion on FR2 MIMO OTA test methodology enhancement**

*Type: discussion For: Approval  
 Source: Huawei,HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216111 Discussions on FR2 MIMO OTA enhancement**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216171 on the FR2 MIMO OTA test methodology enhancement**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216359 Views on the framework for FR2 MIMO OTA requirements**

*Type: discussion For: Approval  
 Source: CAICT*

**Decision:** The document was **not treated**.

**R4-2216413 Discussion on FR2 MIMO OTA requirements**

*Type: discussion For: Approval  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216448 Views on the framework for FR2 MIMO OTA requirement development**

*Type: discussion For: Approval  
 Source: OPPO*

**Decision:** The document was **not treated**.

#### 6.15.3 FR1 MIMO OTA test methodology enhancement

**R4-2215321 on MIMO OTA tests for tablets and smartphones in browsing mode**

*Type: discussion For: (not specified)  
 Source: Huawei Tech.(UK) Co.. Ltd*

**Decision:** The document was **not treated**.

**R4-2215705 Necessity and feasibility of hand phantom MIMO OTA test method**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216112 Discussions on FR1 MIMO OTA enhancement**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216170 on the FR1 MIMO OTA test methodology enhancement**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216358 Discussion on FR1 MIMO OTA testing for hand phantom browsing mode**

*Type: discussion For: Approval  
 Source: CAICT*

**Decision:** The document was **not treated**.

**R4-2216449 FR1 MIMO OTA in browsing mode**

*Type: discussion For: Approval  
 Source: OPPO*

**Decision:** The document was **not treated**.

#### 6.15.4 MU assessment

**R4-2216113 Views on Rel-18 MIMO OTA MU work handling**

*Type: discussion For: Approval  
 Source: vivo*

**Decision:** The document was **not treated**.

#### 6.15.5 Moderator summary and conclusions

**[104-bis-e][327] NR\_MIMO\_OTA\_enh, AI 6.15– Xuan Yi**

**R4-2216911 Email discussion summary for [104-bis-e][327] NR\_MIMO\_OTA\_enh**

*Type: other For: Information  
 Source: Moderator (CAICT)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

### 6.16 BS and UE EMC enhancements

**R4-2216166 on the regulation study of UE EMC**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

#### 6.16.1 General and work plan

**R4-2216168 Rel-18 UE EMC work plan**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216488 BS EMC enhancements - Work Plan proposal**

*Type: Work Plan For: Approval  
 Source: Ericsson*

**Abstract:**

Proposal for work plan on BS EMC enhacements

**Decision:** The document was **not treated**.

#### 6.16.2 BS EMC enhancements

**R4-2215731 Discussion on EMC BS enhancement R18**

*Type: discussion For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2215958 Discussion of BS EMC Enhancement for NR and LTE**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the proposal of optimization of EMC test configurations.

**Decision:** The document was **not treated**.

**R4-2215959 Proposal for Optimization of EMC Test Configurations**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses how to use the proposed optimization method, and the resulting capability sets/test configurations for EMC test purpose.

**Decision:** The document was **not treated**.

#### 6.16.3 UE EMC enhancements

**R4-2216167 on the study phase of UE EMC**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

#### 6.16.4 Moderator summary and conclusions

**[104-bis-e][309] NR\_LTE\_EMC\_enh, AI 6.16– Aurelian Bria**

**R4-2216893 Email discussion summary for [104-bis-e][309] NR\_LTE\_EMC\_enh**

*Type: other For: Information  
 Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

### 6.17 Study on evolution of NR duplex operation

#### 6.17.1 General and work plan

**R4-2215384 Further discussion of the interference modelling for duplex evolution SLS**

*Type: other For: Approval  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216200 General considerations for the study of sub-band full-duplex (SBFD) in RAN4**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216406 On general and deployment considerations for SBFD**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

General considerations

**Decision:** The document was **not treated**.

**R4-2216542 Further discussion on reply LS for full duplex BS**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 6.17.2 Study the feasibility of and impact on RF requirements

**R4-2216836 Duplex enhancements UE-UE CLI modelling remaining aspects**

*Type: discussion For: Discussion  
 Source: MediaTek (Chengdu) Inc.*

**Decision:** The document was **not treated**.

##### 6.17.2.1 Adjacent channel co-existence evaluation

**R4-2215345 SBFD adjacent channel coexistence evaluation**

*Type: other For: Discussion  
 Source: Qualcomm CDMA Technologies*

**Decision:** The document was **not treated**.

**R4-2215385 Further discussion on adjacent channel co-existence simulation assumption**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215486 Study on the simulation assumption for adjacent channel co-existence**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision:** The document was **not treated**.

**R4-2215619 On UE-UE CLI modeling**

*Type: discussion For: Approval  
 Source: Apple*

**Decision:** The document was **not treated**.

**R4-2215776 Discussions on adjacent channel co-existence evaluation**

*Type: discussion For: Approval  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2215789 On interference modelling for duplex evolution**

*Type: discussion For: Discussion  
 Source: LG Electronics Finland*

**Abstract:**

This contribution shows simulation results for UE TX emissions using the UE TX non-linearity model provided in TR 38.803 and proposes a sub-band approach for modeling of TX emissions in system simulations.

**Decision:** The document was **not treated**.

**R4-2215835 On initial results for SBFD adjacent channel co-existence evaluation**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this contribution we present an overview of simulation assumptions and initial simulation results related to SFBD adjacent channel co-existence between two networks.

**Decision:** The document was **not treated**.

**R4-2216133 Further discussion on co-existence in adjacent channel for full duplex**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216201 Assumptions and Initial Simulation results for SBFD coexistence evaluation**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216237 Discussion on the co-existence study for NR duplex operation**

*Type: other For: Approval  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216543 Further discussion on full duplex coexistence in adjacent channel scenario**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

##### 6.17.2.2 Study the feasibility of and impact on RF requirements

###### 6.17.2.2.1 BS aspect

**R4-2215346 SBFD feasibility and impact on RF requirements: BS aspects**

*Type: other For: Discussion  
 Source: Qualcomm CDMA Technologies*

**Decision:** The document was **not treated**.

**R4-2215390 Further discussion on feasibility study for duplex evolution**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2215484 study the feasibility of and impact on RF requirements on gNB side**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision:** The document was **not treated**.

**R4-2216134 Further discussion on self-interference modelling for full duplex from BS aspect**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216202 SBFD Base Station aspects**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216238 Feasibility study from RF perspective**

*Type: other For: Approval  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216239 Evolution of receiver blocking and AGC**

*Type: discussion For: Agreement  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216404 SBFD gNB RF considerations**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Examination of gNB RF issues

**Decision:** The document was **not treated**.

**R4-2216409 Discussion on Total Achievable Self-Interference Cancellation**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

**Decision:** The document was **not treated**.

**R4-2216544 Further discussion on self-interference and CLI for full duplex BS**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216717 Discussion on feasibility and RF impact for SBFD capable gNB**

*Type: discussion For: Approval  
 Source: Samsung*

**Decision:** The document was **not treated**.

###### 6.17.2.2.2 UE aspect

**R4-2215485 Study the feasibility of and impact on RF requirements on UE aspect**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision:** The document was **not treated**.

**R4-2216135 Further discussion on interference modelling for full duplex from UE aspect**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision:** The document was **not treated**.

**R4-2216203 UE to UE interference in Sub Band non-overlapping Full Duplex**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216405 SBFD UE RF considerations**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Extracting UE parameters from the UE spec

**Decision:** The document was **not treated**.

**R4-2216718 Discussion on UE aspect for SBFD operation**

*Type: discussion For: Approval  
 Source: Samsung*

**Decision:** The document was **not treated**.

**R4-2216794 Modelling UE CLI SINR for SBFD system study**

*Type: discussion For: Approval  
 Source: Qualcomm France*

**Decision:** The document was **not treated**.

#### 6.17.3 Summary of regulatory aspects

**R4-2216204 Regulatory considerations on sub-band non-overlapping full duplex operation**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216518 Sub-Band Full Duplex - Regulatory aspects**

*Type: pCR For: Approval  
 38.858 v0.0.2 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

This contribution discusses the regulatory aspects of sub-band full duplex

**Decision:** The document was **not treated**.

#### 6.17.4 Moderator summary and conclusions

**[104-bis-e][310] FS\_NR\_duplex\_evo\_Part1, AI 6.17.1, 6.17.2.2, 6.17.3– Jackson Wang**

**R4-2216894 Email discussion summary for [104-bis-e][310] FS\_NR\_duplex\_evo\_Part1**

*Type: other For: Information  
 Source: Moderator (Samsung)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 14th**

**Issue 1-1-1: BS class and feasibility for self-interference modelling**

* Agreement:
* Considering BS classes for deriving the different value ranges of the RSIC and corresponding RF feasibility study
  + FR1: Different power limits, selectivity level associated with BS classes
  + FR2: The assumption of values for output power (TRP level) with the candidate range {30 ~40 dBm}
    - Others values out of above candidate range not precluded
    - Note 1: Companies are encouraged to provide the detailed assumption with corresponding proposed upper limit value
    - Note 2: Further discuss the power output per antenna element in 2nd round

**Issue 1-1-2: 1dB Desense Target and the threshold for RSIC**

* Agreement:
  + Criteria on gNB UL receiver sensitivity degradation due to self-interference:
  + Taking 1dB sensitivity degradation due to self-interference of DL transmission as baseline target for system level evaluation and feasibility study at current stage from RAN4 perspective
    - Final values used in co-existence evaluation shall be aligned with feasibility analysis conclusion.
    - RAN4 can use 1dB sensitivity degradation as criteria in feasibility study
    - FFS whether other values can be considered for some special cases
    - Above conclusion intended for RAN4 only and other WGs can make conclusion based on their own analysis.

**Issue 1-1-5: Necessity/feasibility on RB level scaling**

* Agreement: gNB self-interference can be modelled as frequency flat.

**Conclusions after 2nd round**

**[104-bis-e][311] FS\_NR\_duplex\_evo\_Part2, AI 6.17.2.1– Chunxia Guo**

**R4-2216895 Email discussion summary for [104-bis-e][311] FS\_NR\_duplex\_evo\_Part2**

*Type: other For: Information  
 Source: Moderator (CMCC)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 14th**

**Issue 1-1-2: [GTW]whether to include co-channel inter-site inter-subband interference into RAN4 simulation**

* Agreement: Include co-channel inter-site inter-subband interference into RAN4 simulation
* BS ACLR/ACS as starting point for simulation purpose only
* FFS on UE side

**Issue 1-1-5: SBFD configuration. [GTW]Further discuss whether we could align with RAN1 agreements, if so, we can end this discussion and wait for RAN1’s agreements.**

* Agreement:
  + Using below sub-band configuration for co-existence simulation

FR1:

* DUD {40MHz, 20MHz, 40MHz}
* DU {80MHz, 20MHz}

FR2:

* DUD {80MHz, 40MHz, 80MHz}
* DU {160MHz, 40MHz}
* Note 1: Above sub-band BW assumption used for simulation not aligned existing RAN4 agreed CHBW sets
* Note 2: Above parameters used for simulation purpose only
  + For the guard-band assumption used for co-existence simulation purpose:
* Companies are encouraged to provide the assumption they used for simulation (whether guard-band assumed and the values of guard-band if any)

**Issue 1-2-1: Further study the priority of case 3**

* Agreement: Case 3: low priority

**Issue 1-4-1: gNB power and antenna configuration**

* Agreement:
* For FR1, using option 1 as baseline assumption
  + - Interested companies can also provide results with option2
* For FR2, reuse the same as in 38.828 Section 5.2.2.5 for FR2

**Issue 1-4-3 gNB mechanical down tilt**

* Agreement:
* FR1: 6 degree for urban macro and 90 degree for indoor
* FR2:
  + - Uma: 6 degree
    - Umi: 10 degree or other value
    - Indoor: 90 degree

**Conclusions after 2nd round**

### 6.22 NR NTN enhancement

#### 6.22.1 General and work plan

**R4-2215709 NR NTN enhancement workplan**

*Type: Work Plan For: Approval  
 Source: NTT DOCOMO, INC.*

**Decision:** The document was **not treated**.

##### 6.22.1.1 System parameters

**R4-2216076 Discussion on Rel-18 NTN regulatory information and ka band**

*Type: other For: Approval  
 Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**R4-2216148 Initial discussion for NR to support non-terrestrial networks**

*Type: other For: Approval  
 Source: Xiaomi*

**Decision:** The document was **not treated**.

**R4-2216372 Discussion on above 10GHz NTN band**

*Type: discussion For: Agreement  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216516 NTN enhancement: System parameters**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

This contribution discusses the system parameters for NTN enhancements

**Decision:** The document was **not treated**.

**R4-2216556 Discussion on system parameter for NTN in Ka band**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216651 Ka band system parameters for NTN**

*Type: discussion For: Approval  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

##### 6.22.1.2 Regulatory information

**R4-2215775 Utilization of frequency range 27.50-28.35GHz spectrum in USA**

*Type: discussion For: Approval  
 Source: Verizon, T-Mobile USA*

**Decision:** The document was **not treated**.

**R4-2216515 NTN enhancement: Regulatory aspects and band discussion**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

This contribution discusses the regulatory context related to NTN operation in Ka-band

**Decision:** The document was **not treated**.

##### 6.22.1.3 Others

#### 6.22.2 Co-existence study for above 10GHz bands

**R4-2215348 VSAT UE Characteristics and Initial Simulation Parameters**

*Type: discussion For: Discussion  
 Source: THALES*

**Abstract:**

This contribution provides material for discussion with respect to Ka-band coexistence simulations and VSAT antenna parameters.

**Decision:** The document was **not treated**.

**R4-2215352 Discussion on Ka-band NTN-TN NR adjacent band coexistence scenarios**

*Type: discussion For: Discussion  
 Source: THALES, Lockheed Martin, Hispasat, Intelsat, Magister Solutions Ltd, Satellite Applications Catapult, ESA, Avanti, Hughes/EchoStar, Inmarsat, Eutelsat, Sateliot*

**Abstract:**

This contribution provides material for discussion on handling of satellite FR2 bands as part of NTN Rel-18 WI.

**Decision:** The document was **not treated**.

**R4-2215777 Simulation assumptions for above 10GHz NTN co-existence study**

*Type: discussion For: Decision  
 Source: Samsung Electronics Nordic AB*

**Decision:** The document was **not treated**.

**R4-2216517 NTN enhancement - coex simulations: scenarios and assumptions**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

This contribution discusses the coexistence scenarios and associated assumptions for NTN operation in the Ka-band

**Decision:** The document was **not treated**.

**R4-2216557 Discussion on coexistence evaluation for NTN in Ka-band**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 6.22.3 SAN RF requirements

**R4-2215415 General consideration on SAN RF requirements for above 10GHz bands**

*Type: other For: Approval  
 Source: CATT*

**Decision:** The document was **not treated**.

**R4-2216558 Discussion on SAN RF requirements for NTN in Ka-band**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 6.22.5 Moderator summary and conclusions

**[104-bis-e][312] NR\_NTN\_enh\_Part1, AI 6.22.1,6.22.3– Dorin Panaitopol**

**R4-2216896 Email discussion summary for [104-bis-e][312] NR\_NTN\_enh\_Part1**

*Type: other For: Information  
 Source: Moderator (Thales)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

**[104-bis-e][313] NR\_NTN\_enh\_Part2, AI 6.22.2– Yiran Jin**

**R4-2216897 Email discussion summary for [104-bis-e][313] NR\_NTN\_enh\_Part2**

*Type: other For: Information  
 Source: Moderator (Samsung)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

### 6.24 NR Network-controlled Repeaters

#### 6.24.1 General and work plan

**R4-2216198 Discussion on NR Network-controlled repeaters**

*Type: other For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216552 Discussion on work plan and spec drafting for NCR in Rel-18**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

#### 6.24.2 Study of RF core and EMC requirements

**R4-2215488 discussion on NCR RF requirements**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision:** The document was **not treated**.

**R4-2216199 On RF core requirements of NR Network-controlled repeaters**

*Type: other For: Approval  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

**R4-2216553 Discussion on RF requirements for NCR in Rel-18**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216789 On RF and EMC requirements for network controlled repeaters**

*Type: other For: Discussion  
 Source: Ericsson France S.A.S*

**Decision:** The document was **not treated**.

**R4-2216793 Network-controlled repeater specification impact in 38.106**

*Type: discussion For: Discussion  
 38.106 v CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm France*

**Abstract:**

Discuss impact of adding network control to core RF specification

**Decision:** The document was **not treated**.

#### 6.24.4 Moderator summary and conclusions

**[104-bis-e][314] NR\_netcon\_repeater, AI 6.24.1, 6.24.2– Xue Fei**

**R4-2216898 Email discussion summary for [104-bis-e][314] NR\_netcon\_repeater**

*Type: other For: Information  
 Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 14th**

**Issue 2-1: RF architecture for NCR in Rel-18**

* Agreements: To have generic diagram for NCR if necessary;

**Issue 2-2 NCR type and NCR class:**

* Aagreements:
* For NCR-fwd link in Rel-18, at least reuse the Rel-17 repeater type/Class i.e.,
  + Repeater Type: 1-C and 2-O;
  + Repeater class: wide-area and local area (DL, UL), medium range for DL
* FFS for repeater type 1-H and 1-O for FR1 repeater given the beamforming capability assumption;
* The baseline assumption that same type/class applied for NCR-fwd link and NCR-MT

**Issue 2-3 NCR-MT UL assumption**

* Agreement: To check with RAN1 on NCR-MT UL transmission to progress the further work in RAN4

**Issue 2-4-1 Dynamic beamforming.**

* Agreement:
  + no new requirement on top of Rel-17 needed as starting point.
  + Agree on directions ~~(as indicated by CMCC R4-2215488)~~ and declaration framework ~~(as indicated by ZTE R4-2216553)~~ as starting point, further details could be discussed further.

**Issue 2-4-3 ON-OFF information:**

* Agreement:
  + For repeater operating in TDD bands, to reuse the existing ON-OFF transition time and ON-OFF power requirement;
  + For repeater operating in FDD bands, to reuse the existing ON-OFF transition time and ON-OFF power requirement;
  + FFS for drafting the related ON/OFF signalling in the RAN4 spec if necessary.

**Issue 2-4-4 BC for NCR-Fwd**

* Agreement
  + To send the LS to check with RAN1 on the BC capability for NCR;

**Issue 2-4-5 multi-band operation for NCR-fwd**

* Agreement: no additional requirements are needed on top of existing Rel-17 repeater requirements for multi-band NCR-fwd.

**Issue 2-5-1 Rx requirements for NCR-MT**

* Agreement: Proposal 1 agreed as starting point pending on the further analysis of the test feasibility

**Issue 2-5-2 Tx requirements for NCR-MT**

* Agreement: Postpone the discussion on Tx requirements for NCR-MT until RAN1 response received.

**Conclusions after 2nd round**

## 7 Rel-18 Work Items for LTE

### 7.4 New bands and BW allocation for 5G terrestrial broadcast - part 2

#### 7.4.4 BS RF requirement maintenance

**R4-2215342 BS requirements for 5G terrestrial broadcast**

*Type: discussion For: Approval  
 Source: SWR*

**Decision:** The document was **not treated**.

**R4-2216550 Further discussion on BS RF requirements for LTE based broadcast**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216735 BS requirements for LTE based 5G terrestrial broadcast band(s)**

*Type: discussion For: Discussion  
 Source: Nokia, Nokia Shanghai Bell*

**Decision:** The document was **not treated**.

#### 7.4.5 Moderator summary and conclusions

**[104-bis-e][315] LTE\_terr\_bcast\_bands\_BSRF, AI 7.4.4– Iwajlo Angelow**

**R4-2216899 Email discussion summary for [104-bis-e][315] LTE\_terr\_bcast\_bands\_BSRF**

*Type: other For: Information  
 Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW discussion on Oct 13th**

**Issue 1-1: BS type**

* Proposals
  + Option 1: Define the BS type 1-C for LTE based broadcast
  + Option 2: Other
* Agreement: Option 1 agreed

**Issue 1-2: BS classes**

* Proposals
  + Option 1: Reuse the Wide area BS class for LPLT and define new BS class for HPHT and MPMT
  + Option 2: Other
* Discussion:
  + ZTE: We are fine to postpone the decision based on co-existence study and RF requirements.
  + Nokia: We can further analyze based on the requirements from regulation.
  + Huawei: In main session, we have conclusion that no need the co-existence study.
* Agreement: Postpone the decision of BS classes pending on the investigation of RF requirements and scenario assumptions for regulatory requirements.

**Issue 1-4: BS ACLR requirement**

* Proposals
  + Option 1: According to R4-2216550 (depends on the outcome of coexistence study)
  + Option 2: According to R4-2215342 (derive the required values for ACLR values by the outlined methodology based on ITU-R Recommendations or equivalent regulatory documentation)
  + Option 3: Other
* Agreement: Further discuss based on the analysis on the regulatory requirements.

**Issue 1-5: Regulatory requirements**

* Proposals
  + Option 1: Use the reference approach instead of explicitly list the regulatory requirement in the spec
  + Option 2: Other
* Discussion:
  + ZTE: We prefer option 1 with reference approach to save editors’ work into specification.
  + SWR: We share similar view as ZTE, we need to further discuss the details for reference approach.
  + Ericsson: We don’t have concern reference approach. Which regulation shall be referred, following the WID? Some of regulation don’t have English version.
  + QC: We have similar concern which regulation refereed, without clear requirements into specification. Similar issue for UE specification.
  + Huawei: In current WID, regulations for region 1,2, 3 already be included. It’s complicated to use the reference approach.
  + SWR: We suggest to further analyze the details how the reference approach works.
  + Nokia: We can further discuss how the reference works.
  + QC: If using reference approach, do we have exact value into specification i.e. ACLR requirements?
  + ZTE: ACLR requirements still need to be specified into specification.
  + Nokia: Minimum set of requirements still need to explicitly specify into specification, some additional regulatory requirements can be used reference approach.
  + SWR: If 3GPP not compliance with regulation, we may face some problems.
  + Nokia: We have a dedicated topic to list the candidate requirements which need to be specified into BS speciation.
* Agreement: Baseline assumption is using reference approach instead of explicitly list the regulatory requirements into the spec; further work on the details together with the discussion on the RF requirements.

**Conclusions after 2nd round**

### 7.5 NB-IoT/eMTC core & perf. requirements for NTN

#### 7.5.3 Co-existence verification

**R4-2216418 Coexistence simulation results for TN-NTN NB IoT**

*Type: discussion For: Approval  
 Source: Qualcomm Incorporated*

**Decision:** The document was **not treated**.

**R4-2216547 Further discussion on simulation assumptions and evaluation results for IoT over NTN**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216634 IoT NTN coexisting initial results**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this paper, we present our initial results on the IoT NTN /TN coexisting simulation.

**Decision:** The document was **not treated**.

**R4-2216800 IoT NTN coexistence remaining aspects**

*Type: discussion For: Discussion  
 Source: MediaTek (Chengdu) Inc.*

**Decision:** The document was **not treated**.

#### 7.5.4 SAN RF requirements

**R4-2216545 Draft spec for TS 36.108**

*Type: draft TS For: Approval  
 36.108 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216548 Further discussion on SAN RF requirements for IoT over NTN**

*Type: other For: Approval  
 Source: ZTE Corporation*

**Decision:** The document was **not treated**.

**R4-2216638 TP for SAN RF requirement**

*Type: pCR For: Approval  
 36.108 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

In this paper, TP is proposed for some of SAN requirement.

**Decision:** The document was **not treated**.

#### 7.5.7 Moderator summary and conclusions

**[104-bis-e][316] IoT\_NTN\_Co-existence\_SANRF, AI 7.5.3, 7.5.4– Fei Xue**

**R4-2216900 Email discussion summary for [104-bis-e][316] IoT\_NTN\_Co-existence\_SANRF**

*Type: other For: Information  
 Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**Conclusions after 2nd round**

## BACKUP

**R4-22AAAAA Email discussion summary for**

*Type: other For: Information  
 Source: Moderator (TBA)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-22AXXXX WF for**

*Type: other For: Approval  
 Source:*

**Abstract:**

**Discussion:**

**Decision: Return to.**