**3GPP TSG-RAN WG4 Meeting #108 R4-23xxxxx**

**Toulouse, France, 21 – 25 August 2023**

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

**Title:** **BS RF Demod Test session report for RAN4#108**

**Agenda item:** **2**

**Document for: Approval**

## 2 Meeting arrangement and events

### 2.3 Summary of sessions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Topic title** | **Topic areas** | **AI** | **Moderator &Summary AI** |
| 300 | [108][300] BSRF\_Demod\_Test\_Session | N.A. | N.A. | Haijie Qiu |
| 301 | [108][301] BSRF\_Maintenance | Rel-16 BS RF maintenance Rel-17 BS RF maintenance | 4.2 5.2.1 6 (R4-2311663) | Johan Sköld AI 5.4 |
| 302 | [108][302] NR\_ext\_to\_71GHz\_BSRF\_Maintenance | Rel-17 FR2-2 BS RF conformance maintenance | 5.2.6.1, 5.2.6.2 | Michal Szydelko AI 5.4 |
| 303 | [108][303] NR\_ATG\_BSRF | Rel-18 NR\_ATG BS RF core requirements | 8.13.3 | Wubin Zhou AI 8.13.6 |
| 304 | [108][304] NR\_FR1\_lessthan\_5MHz\_BW\_BSRF | Rel-18 Less than 5MHz BW: RF | 8.14.3 | Man Hung  AI 8.14.5 |
| 305 | [108][305] NR\_LTE\_EMC\_enh | EMC maintenance  Rel-18 NR EMC | 4.3 8.17 | Aurelian Bria AI 8.17.4 |
| 306 | [108][306] FS\_NR\_duplex\_evo\_Part1 | Rel-18 NR Duplex evolution SI: General, RF feasibility and impact from BS perspective, regulatory | 8.19.1, 8.19.2.2.1, 8.19.2.2.2, 8.19.2.3, 8.19.3 | He Wang AI 8.19.4 |
| 307 | [108][307] FS\_NR\_duplex\_evo\_Part2 | Rel-18 NR Duplex evaluation SI: RF feasibility and impact from UE perspective, | 8.19.2.2.3, 8.19.2.2.4, 8.19.2.4 | Phil Coan  AI 8.19.4 |
| 308 | [108][308] FS\_NR\_duplex\_evo\_Part3 | Rel-18 NR Duplex evolution SI: Adjacent channel co-existence evaluation | 8.19.2.1 | Chunxia Guo AI 8.19.4 |
| 309 | [108][309] NR\_NTN\_enh\_Part1 | Rel-18 NTN system parameters, regulatory | 8.26.1 | Dorin Panaitopol AI 8.26.6 |
| 310 | [108][310] NR\_NTN\_enh\_Part2 | Rel-18 NTN SAN RF | 8.26.3 | Dominique Everaere AI 8.26.6 |
| 311 | [108][311] NR\_NTN\_enh\_Part3 | Rel-18 NTN co-existence evaluation | 8.26.2 | Yiran Jin AI 8.26.6 |
| 312 | [108][312] NR\_netcon\_repeater\_RF | Rel-18 Network control repeater: General, RF and EMC | 8.28.1, 8.28.2, 8.28.3 | Fei Xue 8.28.7 |
| 313 | [108][313] NR\_netcon\_repeater\_RFConformance | Rel-18 Network control repeater: RF conformance | 8.28.4 | Huiping Shan 8.28.7 |
| 314 | [108][314] NR\_mobile\_IAB\_RF | NR\_mobile\_IAB: General, co-existence, RF core | 8.33.1, 8.33.2, 8.33.3 | Mustafa Emara AI 8.33.5 |
| 315 | [108][315] LTE\_terr\_bcast\_bands\_BSRF | New bands for 5G terrestrial broadcast: BS RF | 9.3.4 | Iwajlo Angelow AI 9.3.5 |
| 316 | [108][316] IoT\_NTN\_SANRF | Rel-18 IoT NTN SAN RF maintenance, RF conformance | 6.8.1 | Michal Szydelko AI 6.9 |
| 317 | [108][317] Demod\_Maintenance | Rel-16 Demod maintenance  Rel-17 FR2-2 Demod Rell-17 Demod maintenance | 4.5 5.2.6.5 5.2.4 | Axel Mueller AI 5.4 |
| 318 | [108][318] IoT\_NTN Demod\_Maintenance | Rel-18 IoT\_NTN Demod | 6.8.5 | Licheng Lin AI 6.9 |
| 319 | [108][319] RF\_FR1\_enh2\_Demod\_Part1 | Rel-18 NR\_ENDC\_ RF\_FR1\_enh2 demodulation part1: 8Rx | 8.4.3.1 | Tricia Li AI 8.4.4 |
| 320 | [108][320] RF\_FR1\_enh2\_Demod\_Part2 | Rel-18 NR\_ENDC\_ RF\_FR1\_enh2 demodulation part2: 4Tx | 8.4.3.2 | Jiakai Si AI 8.4.4 |
| 321 | [108][321] NR\_RF\_FR2\_req\_Ph3\_Demod | Rel-18: FR2 RF enhancement demodulation | 8.6.4 | Alexander Hamilton AI 8.6.5 |
| 322 | [108][322] NR\_FR2\_multiRX\_DL\_Demod | Rel-18 Requirement for NR FR2 multi-Rx chain DL reception: Demodulation part | 8.7.4 | Jahidur Rahman AI 8.7.5 |
| 323 | [108][323] NonCol\_intraB\_ENDC\_NR\_CA\_Demod | Rel-18 Support of intra-band non-collocated EN-DC/NR-CA deployment: Demodulation part | 8.11.4 | Kazuyoshi Uesaka  AI 8.11.5 |
| 324 | [108][324] NR\_HST\_FR2\_enh\_Demod | Rel-18 FR2 HST: Demod part | 8.12.5 | Yunchuan Yang AI 8.12.6 |
| 325 | [108][325] NR\_ATG\_Demod | Rel-18 NR ATG demodulation | 8.13.5 | Shiyuan Wang AI 8.13.6 |
| 326 | [108][326] NR\_demod\_enh3\_Part1 | Rel-18 NR\_demod\_enh3: Advanced receiver for MU-MIMO | 8.18.1 | Shan Yang AI 8.18.3 |
| 327 | [108][327] NR\_demod\_enh3\_Part2 | Rel-18 NR\_demod\_enh3: ATP | 8.18.2 | Manasa Raghavan AI 8.18.3 |
| 328 | [108][328] NR\_netcon\_repeater\_Demod | Rel-18 Network control repeater: Demod | 8.28.6 | Yao Kun 8.28.7 |
| 329 | [108][329] FS\_NR\_FR2\_OTA\_enh | Rel-17 test methed maintenance Rel-18 FR2 OTA test method enhancement | ~~4.6~~ 5.2.5 (R4-2311231)8.2 | Bin Han AI 8.2.6 |
| 330 | [108][330] NR\_FR1\_TRP\_TRS\_enh | Rel-17 TRP TRS maintenance Rel-18 TRP/TRS enhancement | ~~5.2.5~~ 8.15 | Ruixin Wang AI 8.15.4 |
| 331 | [108][331] NR\_MIMO\_OTA\_enh | Rel-17 MIMO OTA maintenance Rel-18 MIMO OTA enhancement | 5.2.5 (except R4-2311231) 8.16 | Xuan Yi AI 8.16.6 |
| 332 | [108][332] LS\_NTN\_R5-233672 | LS response to RAN5 on NTN conformance R5-233672 | 10.2.3 (R4-2311688 , R4-2311767 , R4-2313262,R4-2313372, R4-2313489 , R4-2313635 R4-2313636, R4-2313637, R4-2313638, R4-2313639 R4-2313640) | Dorin Panaitopol AI 10.4 |

## 3A Topic Summary (pre-meeting)

### 3A.3 BSRF\_Demod session topic summaries

|  |  |
| --- | --- |
| **T-doc** | **Title** |
| R4-2314237 | Topic summary for [108][301] BSRF\_Maintenance |
| R4-2314238 | Topic summary for [108][302] NR\_ext\_to\_71GHz\_BSRF\_Maintenance |
| R4-2314239 | Topic summary for [108][303] NR\_ATG\_BSRF |
| R4-2314240 | Topic summary for [108][304] NR\_FR1\_lessthan\_5MHz\_BW\_BSRF |
| R4-2314241 | Topic summary for [108][305] NR\_LTE\_EMC\_enh |
| R4-2314242 | Topic summary for [108][306] FS\_NR\_duplex\_evo\_Part1 |
| R4-2314243 | Topic summary for [108][307] FS\_NR\_duplex\_evo\_Part2 |
| R4-2314244 | Topic summary for [108][308] FS\_NR\_duplex\_evo\_Part3 |
| R4-2314245 | Topic summary for [108][309] NR\_NTN\_enh\_Part1 |
| R4-2314246 | Topic summary for [108][310] NR\_NTN\_enh\_Part2 |
| R4-2314247 | Topic summary for [108][311] NR\_NTN\_enh\_Part3 |
| R4-2314248 | Topic summary for [108][312] NR\_netcon\_repeater\_RF |
| R4-2314249 | Topic summary for [108][313] NR\_netcon\_repeater\_RFConformance |
| R4-2314250 | Topic summary for [108][314] NR\_mobile\_IAB\_RF |
| R4-2314251 | Topic summary for [108][315] LTE\_terr\_bcast\_bands\_BSRF |
| R4-2314252 | Topic summary for [108][316] IoT\_NTN\_SANRF |
| R4-2314253 | Topic summary for [108][317] Demod\_Maintenance |
| R4-2314254 | Topic summary for [108][318] IoT\_NTN Demod\_Maintenance |
| R4-2314255 | Topic summary for [108][319] RF\_FR1\_enh2\_Demod\_Part1 |
| R4-2314256 | Topic summary for [108][320] RF\_FR1\_enh2\_Demod\_Part2 |
| R4-2314257 | Topic summary for [108][321] NR\_RF\_FR2\_req\_Ph3\_Demod |
| R4-2314258 | Topic summary for [108][322] NR\_FR2\_multiRX\_DL\_Demod |
| R4-2314259 | Topic summary for [108][323] NonCol\_intraB\_ENDC\_NR\_CA\_Demod |
| R4-2314260 | Topic summary for [108][324] NR\_HST\_FR2\_enh\_Demod |
| R4-2314261 | Topic summary for [108][325] NR\_ATG\_Demod |
| R4-2314262 | Topic summary for [108][326] NR\_demod\_enh3\_Part1 |
| R4-2314263 | Topic summary for [108][327] NR\_demod\_enh3\_Part2 |
| R4-2314264 | Topic summary for [108][328] NR\_netcon\_repeater\_Demod |
| R4-2314265 | Topic summary for [108][329] FS\_NR\_FR2\_OTA\_enh |
| R4-2314266 | Topic summary for [108][330] NR\_FR1\_TRP\_TRS\_enh |
| R4-2314267 | Topic summary for [108][331] NR\_MIMO\_OTA\_enh |
| R4-2314268 | Topic summary for [108][332] LS\_NTN\_R5-233672 |

## 4 Up to Rel-16 maintenance for LTE and NR

The following contributions have been moved and will be treatedi n the respective topic threads.

For Rel-15/16 maintenance, please submit formal CRs. When you reserve the tdoc number, please use the correct WI code rather than simply using TEI and fill the column of “Related WIs” in your reservation spreadsheet. If you submit a CR with TEI as WI code, please inform session chair.

When submitting contributions to AI 4, please add [WI\_code] in the beginning of titles for both discussion files and CRs to facilitate handling of moderators and session chairs.

### 4.2 BS RF requirements and BS conformance testing

[RInImp9-Rfmulti, TEI12] CR to TS 37.104: FFS removal

**R4-2313600 [RInImp9-Rfmulti, TEI12] CR to TS 37.104: FFS removal, Rel-12**

*Type: CR For: Agreement  
 37.104 v12.14.0 CR-0992 rev Cat: F (Rel-12)  
  
 Source: Huawei, HiSilicon*

**Discussion:**

Ericsson flags R4-2313600: Not a necessary change from Rel-12.  
R4-2313603 is OK.  
Flags R4-2313809: Should be Cat A CR, Multiband FDD/TDD sentence should not be deleted.

**Decision: Not pursued.**

**R4-2313601 [RInImp9-Rfmulti, TEI12] CR to TS 37.104: FFS removal, Rel-13**

*Type: CR For: Agreement  
 37.104 v13.9.0 CR-0993 rev Cat: A (Rel-13)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2313602 [RInImp9-Rfmulti, TEI12] CR to TS 37.104: FFS removal, Rel-14**

*Type: CR For: Agreement  
 37.104 v14.8.0 CR-0994 rev Cat: A (Rel-14)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2313603 [RInImp9-Rfmulti, TEI15] CR to TS 37.104: FFS removal, Rel-15**

*Type: CR For: Agreement  
 37.104 v15.18.0 CR-0995 rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313604 [RInImp9-Rfmulti, TEI15] CR to TS 37.104: FFS removal, Rel-16**

*Type: CR For: Agreement  
 37.104 v16.17.0 CR-0996 rev Cat: A (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313605 [RInImp9-Rfmulti, TEI15] CR to TS 37.104: FFS removal, Rel-17**

*Type: CR For: Agreement  
 37.104 v17.9.0 CR-0997 rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313809 [RInImp9-Rfmulti, TEI18] CR to TS 37.104: FFS removal, Rel-18**

*Type: CR For: Agreement  
 37.104 v18.2.0 CR-0999 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

Ericsson: We believe to keep the FFS as it is to reflect the fact.

**Decision: Revised to R4-2313951 (from R4-2313809).**

**R4-2313951 [RInImp9-Rfmulti, TEI18] CR to TS 37.104: FFS removal, Rel-18**

*Type: CR For: Agreement  
 37.104 v18.2.0 CR-0999 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313606 [RInImp9-Rfmulti, TEI15] CR to TS 37.104: FFS removal, Rel-18**

*Type: CR For: Agreement  
 37.104 v18.2.0 CR-0998 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

NEC flags on R4-2313606, 13809. Rel-18 documents are not for a frozen release. It would be better to keep FFS until the release will be frozen or consensus will be achieved.

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

[MSR\_NC-Perf] Correction to TS 37.141 for MSR BS

**R4-2311538 [MSR\_NC-Perf] CR to TS 37.141 NR with Multipath fading of GSM for MSR BS**

*Type: CR For: Agreement  
 37.141 v16.18.0 CR-1047 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311539 [MSR\_NC-Perf] CR to TS 37.141 NR with Multipath fading of GSM for MSR BS**

*Type: CR For: Agreement  
 37.141 v17.10.0 CR-1048 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311540 [MSR\_NC-Perf] CR to TS 37.141 NR with Multipath fading of GSM for MSR BS**

*Type: CR For: Agreement  
 37.141 v18.2.0 CR-1049 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311541 [MSR\_NC-Perf] CR to TS 37.141 with correction to interference signal bandwidth for MSR BS**

*Type: CR For: Agreement  
 37.141 v15.20.0 CR-1050 rev Cat: F (Rel-15)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311542 [MSR\_NC-Perf] CR to TS 37.141 with correction to interference signal bandwidth for MSR BS**

*Type: CR For: Agreement  
 37.141 v16.18.0 CR-1051 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311543 [MSR\_NC-Perf] CR to TS 37.141 with correction to interference signal bandwidth for MSR BS**

*Type: CR For: Agreement  
 37.141 v17.10.0 CR-1052 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311544 [MSR\_NC-Perf] CR to TS 37.141 with correction to interference signal bandwidth for MSR BS**

*Type: CR For: Agreement  
 37.141 v18.2.0 CR-1053 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311548 [MSR\_NC-Perf] CR to TS 37.141 with the rated output power definition of the test signal for MSR BS**

*Type: CR For: Agreement  
 37.141 v16.18.0 CR-1054 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

Ericsson flags R4-2311548: Wording improvement and use of "narrow channel BW".

Huawei flags R4-2311548: The wording "adjacent to the lower Base Station RF Bandwidth edge" need to be improved.

**Decision: Revised to R4-2313952 (from R4-2311548).**

**R4-2313952 [MSR\_NC-Perf] CR to TS 37.141 with the rated output power definition of the test signal for MSR BS**

*Type: CR For: Agreement  
 37.141 v16.18.0 CR-1054 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311549 [MSR\_NC-Perf] CR to TS 37.141 with the rated output power definition of the test signal for MSR BS**

*Type: CR For: Agreement  
 37.141 v17.10.0 CR-1055 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311550 [MSR\_NC-Perf] CR to TS 37.141 with the rated output power definition of the test signal for MSR BS**

*Type: CR For: Agreement  
 37.141 v18.2.0 CR-1056 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

[AAS\_BS\_LTE\_UTRA-Perf] Correction to TS 37.145-1/-2 for AAS BS

**R4-2311545 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with corrections to TCs for AAS BS conformance testing**

*Type: CR For: Agreement  
 37.145-1 v16.13.0 CR-0317 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

Nokia flag own Nokia CR R4-2311545 - we have got some offline comments to add "Note 2" in OBUE table 5.2-1. The reason is to align with other specs. Revision of this CR is uploaded to the draft folder.

Huawei flags R4-2311545: Please clarify reason on the use of SC

**Decision: Revised to R4-2313953 (from R4-2311545).**

**R4-2313953 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with corrections to TCs for AAS BS conformance testing**

*Type: CR For: Agreement  
 37.145-1 v16.13.0 CR-0317 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311546 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with corrections to TCs for AAS BS conformance testing**

*Type: CR For: Agreement  
 37.145-1 v17.8.0 CR-0318 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311547 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with corrections to TCs for AAS BS conformance testing**

*Type: CR For: Agreement  
 37.145-1 v18.2.0 CR-0319 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311551 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with test signal configuration changes for AAS BS**

*Type: CR For: Agreement  
 37.145-1 v16.13.0 CR-0320 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

Huawei flags R4-2311551: we propose to change the wording "the narrowest E-UTRA and NR channel BW" to "the narrowest E-UTRA and/or NR channel BW"

**Decision: Revised to R4-2313954 (from R4-2311551).**

**R4-2313954 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with test signal configuration changes for AAS BS**

*Type: CR For: Agreement  
 37.145-1 v16.13.0 CR-0320 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311552 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with test signal configuration changes for AAS BS**

*Type: CR For: Agreement  
 37.145-1 v17.8.0 CR-0321 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311553 [AAS\_BS\_LTE\_UTRA-Perf] CR to TS 37.145-1 with test signal configuration changes for AAS BS**

*Type: CR For: Agreement  
 37.145-1 v18.2.0 CR-0322 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311723 [AASenh\_BS\_LTE\_UTRA-Perf] CR to TR 37.145-2: Corrections on table references for E-UTRA in-channel selectivity test requirement**

*Type: CR For: Agreement  
 37.145-2 v15.15.0 CR-0354 rev Cat: F (Rel-15)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311724 [AASenh\_BS\_LTE\_UTRA-Perf] CR to TR 37.145-2: Corrections on table references for E-UTRA in-channel selectivity test requirement**

*Type: CR For: Agreement  
 37.145-2 v16.14.0 CR-0355 rev Cat: A (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311725 [AASenh\_BS\_LTE\_UTRA-Perf] CR to TR 37.145-2: Corrections on table references for E-UTRA in-channel selectivity test requirement**

*Type: CR For: Agreement  
 37.145-2 v17.8.0 CR-0356 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2311726 [AASenh\_BS\_LTE\_UTRA-Perf] CR to TR 37.145-2: Corrections on tables for E-UTRA in-channel selectivity test requirement**

*Type: CR For: Agreement  
 37.145-2 v18.2.0 CR-0357 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

[NR\_newRAT-Core] Correction to TS 38.104/38.141-1/-2, TS 37.104/141/145-1/145-2 on ACLR and CACLR requirements

**R4-2312098 CR to 38.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 38.104 v16.16.0 CR-0506 rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312099 CR to 38.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0507 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312100 CR to 38.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0508 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312101 CR to 38.141-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 38.141-1 v16.16.0 CR-0368 rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312102 CR to 38.141-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0369 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312103 CR to 38.141-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0370 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312104 CR to 37.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.104 v15.18.0 CR-0988 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312105 CR to 37.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.104 v16.17.0 CR-0989 rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312106 CR to 37.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.104 v17.9.0 CR-0990 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312107 CR to 37.104: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.104 v18.2.0 CR-0991 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312108 CR to 37.141: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.141 v15.20.0 CR-1058 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312109 CR to 37.141: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.141 v16.18.0 CR-1059 rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312110 CR to 37.141: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.141 v17.10.0 CR-1060 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312111 CR to 37.141: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.141 v18.2.0 CR-1061 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312112 CR to 37.145-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-1 v15.14.0 CR-0324 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312113 CR to 37.145-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-1 v16.13.0 CR-0325 rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312114 CR to 37.145-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-1 v17.8.0 CR-0326 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312115 CR to 37.145-1: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-1 v18.2.0 CR-0327 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312116 CR to 37.145-2: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-2 v15.15.0 CR-0359 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312117 CR to 37.145-2: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-2 v16.14.0 CR-0360 rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312118 CR to 37.145-2: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-2 v17.8.0 CR-0361 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312119 CR to 37.145-2: Correction to ACLR and CACLR requirement**

*Type: CR For: Agreement  
 37.145-2 v18.2.0 CR-0362 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

[NR\_newRAT-Perf] Correction to TS 38.141-2/-1 on REFSENS

**R4-2311582 CR for TS 38.141-2, Correction on reference of EISminSENS, EISREFSENS and EISREFSENS\_50M**

*Type: CR For: Agreement  
 38.141-2 v15.18.0 CR-0520 rev Cat: F (Rel-15)  
  
 Source: CATT*

Keysight flags on R4-2311582,4,6,8. Original text is correct, should not be changed because these tests are with TT=0, while refsense test has TT=MU so that refsense test number should not be referred by these tests.

Ericsson flags on R4-2311582. The updates regarding FR2 should go to FR2 core requirements.

NEC flags on R4-2311582, 584, 586, 588. EISminSENS, by definition, is a declared value which does not include test tolerance. Minimum requirements should be referred for EISminSENS. Minimum requirements should be referred for EISREFSENS and PREFSENS, too.

**Decision: Not pursued.**

**R4-2311583 CR for TS 38.141-2, Correction on reference of EISminSENS, EISREFSENS and EISREFSENS\_50M**

*Type: CR For: Agreement  
 38.141-2 v16.16.0 CR-0521 rev Cat: A (Rel-16)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311584 CR for TS 38.141-2, Correction on reference of EISminSENS, EISREFSENS and EISREFSENS\_50M**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0522 rev Cat: F (Rel-17)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311585 CR for TS 38.141-2, Correction on reference of EISminSENS, EISREFSENS and EISREFSENS\_50M**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0523 rev Cat: A (Rel-18)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311586 CR for TS 38.141-1, Correction on reference of PREFSENS**

*Type: CR For: Agreement  
 38.141-1 v15.15.0 CR-0357 rev Cat: F (Rel-15)  
  
 Source: CATT*

**Decision: Postponed.**

**R4-2311587 CR for TS 38.141-1, Correction on reference of PREFSENS**

*Type: CR For: Agreement  
 38.141-1 v16.16.0 CR-0358 rev Cat: A (Rel-16)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311588 CR for TS 38.141-1, Correction on reference of PREFSENS**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0359 rev Cat: F (Rel-17)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311589 CR for TS 38.141-1, Correction on reference of PREFSENS**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0360 rev Cat: A (Rel-18)  
  
 Source: CATT*

**Decision: Withdrawn.**

[NR\_newRAT-Perf] Correction to TS 38.104 on FR2-2 CHBW table

**R4-2311903 Update to table format for enabling automated data scraping**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0502 rev Cat: F (Rel-17)  
  
 Source: ROHDE & SCHWARZ*

Nokia wants to flag R4-2311903, other affected specifications are not filled on the cover page, should indicate no other specification is affected.

Huawei flags R4-2311903: Underlining should be removed.

NEC flags on R4-2311903. We do not agree to use underline and green colored characters.

**Decision: Revised to R4-2313955 (from R4-2311903).**

**R4-2313955 Update to table format for enabling automated data scraping**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0502 rev Cat: F (Rel-17)  
  
 Source: ROHDE & SCHWARZ*

**Decision: Agreed.**

**R4-2311916 Update to table format for enabling automated data scraping**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0503 rev Cat: A (Rel-18)  
  
 Source: ROHDE & SCHWARZ*

**Decision: Agreed.**

[NR\_IAB-Core/Perf] Correction to TS 38.174/38.176-2 on IAB scaling factor

**R4-2311590 CR for TS 38.174, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.174 v16.8.0 CR-0057 rev Cat: F (Rel-16)  
  
 Source: CATT*

NEC flags on R4-2311590, 593. Concern on adopting Ncells for IAB-MT scaling.

**Decision: Revised to R4-2313925 (from R4-2311590).**

**R4-2313925 CR for TS 38.174, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.174 v16.8.0 CR-0057 rev Cat: F (Rel-16)  
  
 Source: CATT, NEC*

**Decision: Agreed.**

**R4-2311591 CR for TS 38.174, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.174 v17.4.0 CR-0058 rev Cat: A (Rel-17)  
  
 Source: CATT, NEC*

**Decision: Agreed.**

**R4-2311592 CR for TS 38.174, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.174 v18.1.0 CR-0059 rev Cat: A (Rel-18)  
  
 Source: CATT, NEC*

**Decision: Agreed.**

**R4-2311593 CR for TS 38.176-2, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.176-2 v16.6.0 CR-0028 rev Cat: F (Rel-16)  
  
 Source: CATT*

Huawei flags R4-2311593: co-ex in 6.7.5.4.5.1 and colocation in Table 6.7.5.5.5.1-1 is not supposed to be subject to scaling. Please compare with TS 38.141-2.

**Decision: Not pursued.**

**R4-2313926 CR for TS 38.176-2, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.176-2 v16.6.0 CR-0028 rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311594 CR for TS 38.176-2, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.176-2 v17.5.0 CR-0029 rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2311595 CR for TS 38.176-2, Correction on scaling factor for IAB-MT type 1-O**

*Type: CR For: Agreement  
 38.176-2 v18.1.0 CR-0030 rev Cat: A (Rel-18)  
  
 Source: CATT*

**Decision: Withdrawn.**

[NR\_newRAT-Perf] Correctios to TS 37.145-2/38.141-2

**R4-2313735 Proposal for clean-up and improvements on BS specifications**

*Type: other For: Discussion  
 Source: Ericsson*

**Proposal:** Initiate a task force in RAN4 to improve the BS specification involving clarifications as described above, removal of controversial and confusing statements and editorial changed to align with 3GPP drafting rules.

Huawei: In general, we are fine for the goal. We prefer to have this in Rel-19.

Nokia: We may need to have dedicated WI to address this issue similar as EMC.

**Decision: Noted.**

**R4-2313736 TS 37.145-2: Corrections**

*Type: CR For: Agreement  
 37.145-2 v15.15.0 CR-0363 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

Keysight flags on R4-2313736, 740, question on following text added in procedure of TRP tests, not sure if this text is really needed and "two method" which two? there are five methods written in 37.941 as of now.

"When calibrated and operated within  the guidance of 3GPP TR 37 941 [29] the two methods are applicable and selected depending on availability at the test facility."

Huawei flags R4-2313736 and R4-2313740: checking internally with the delegate involved in related TFES discussions.

Nokia flags R4-2313736, R42313740:Proposal in R4-2313735 is to replace “declaration” with “intended use of the equipment” but in the CRs 'declared' is removed but 'intended' is not added.Is added clause 6.7.4.2.2.3 only applicable for EIPR limits like table 6.7.5.4.5-4?

Huawei flags R4-2313736 and R4-2313740: checking internally with the delegate involved in related TFES discussions.

**Decision: Revised to R4-2313956 (from R4-2313736).**

**R4-2313956 TS 37.145-2: Corrections**

*Type: CR For: Agreement  
 37.145-2 v15.15.0 CR-0363 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313737 TS 37.145-2: Corrections**

*Type: CR For: Agreement  
 37.145-2 v16.14.0 CR-0364 rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313738 TS 37.145-2: Corrections**

*Type: CR For: Agreement  
 37.145-2 v17.8.0 CR-0365 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313739 TS 37.145-2: Corrections**

*Type: CR For: Agreement  
 37.145-2 v18.2.0 CR-0366 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313740 TS 38.141-2: Corrections**

*Type: CR For: Agreement  
 38.141-2 v15.18.0 CR-0543 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Revised to R4-2313957 (from R4-2313740).**

**R4-2313957 TS 38.141-2: Corrections**

*Type: CR For: Agreement  
 38.141-2 v15.18.0 CR-0543 rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313741 TS 38.141-2: Corrections**

*Type: CR For: Agreement  
 38.141-2 v16.16.0 CR-0544 rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313742 TS 38.141-2: Corrections**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0545 rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313743 TS 38.141-2: Corrections**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0546 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

[NR\_IAB-Core] Correction to TS 38.174 on FR2 range

**R4-2313477 CR to correct FR2 range in IAB specifiaiton**

*Type: CR For: Agreement  
 38.174 v17.4.0 CR-0066 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

Keysight flags on R4-2313477. "FR2" should not be automatically expanded to include FR2-2. there are more to change such as interferer definition etc. more careful checking should be performed on these specs which assumed FR2=FR2-1 to include FR2-2.

Nokia: We don’t have similar table in test specifciation, but we reuse FR2 in some places in test specifications. Do we need to addres them as well?

Keysight: There is similar issue in other specifciations when referring to FR2, considering FR2-1 and FR2-2 updated.

**Decision: Revised to R4-2313958 (from R4-2313477).**

**R4-2313958 CR to correct FR2 range in IAB specifiaiton**

*Type: CR For: Agreement  
 38.174 v17.4.0 CR-0066 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2313478 CR to correct FR2 range in IAB specifiaiton**

*Type: CR For: Agreement  
 38.174 v18.1.0 CR-0067 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

[NR\_newRAT-Core] Correction to TR 38.817-02

**R4-2311659 [NR\_newRAT-Core] CR to TR 38.817-02: Clarification on calculation of CW frequency offset for conducted narrowband receiver intermodulation requirement in FR1**

*Type: CR For: Agreement  
 38.817-02 v15.10.0 CR-0070 rev Cat: F (Rel-15)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

[OTA\_BS\_testing-Perf] Correction to TR 37.941

**R4-2312375 CR to TR 37.941: Improvement of RC description in subclause 7.8, 8.8, 11.2.5, 11.3.5 and 11.4.5**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0043 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Revised to R4-2313968 (from R4-2312375).**

**R4-2313968 CR to TR 37.941: Improvement of RC description in subclause 7.8, 8.8, 11.2.5, 11.3.5 and 11.4.5**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0043 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

[OTA\_BS\_testing-Perf] CR to TR 37.941

**R4-2313596 [OTA\_BS\_testing-Perf] CR to TR 37.941: correction of the applicability of General Chamber (co-location, out-of-band requirements), Rel-15**

*Type: CR For: Agreement  
 37.941 v15.3.0 CR-0045 rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon*

Session chair note: R4-231596~2313599 move to this AI from AI 4.6.

**Decision: Agreed.**

**R4-2313597 [OTA\_BS\_testing-Perf] CR to TR 37.941: correction of the applicability of General Chamber (co-location, out-of-band requirements), Rel-16**

*Type: CR For: Agreement  
 37.941 v16.5.0 CR-0046 rev Cat: A (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313598 [OTA\_BS\_testing-Perf] CR to TR 37.941: correction of the applicability of General Chamber (co-location, out-of-band requirements), Rel-17**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0047 rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313599 [OTA\_BS\_testing-Perf] CR to TR 37.941: correction of the applicability of General Chamber (co-location, out-of-band requirements), Rel-18**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0048 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

Session chair note: Need to check MCC whether proper way to generate Rel-18 version with CAT A CR.

**Decision: Withdrawn.**

### 4.3 UE/BS EMC requirements

[NR\_newRAT-Core] CR on TS 38.175

**R4-2312070 [NR\_newRAT-Core] CR on TS 38.175 IAB reference maintenance R17**

*Type: CR For: Agreement  
 38.175 v17.3.0 CR-0030 rev Cat: F (Rel-17)  
  
 Source: ZTE*

**Decision: Revised to R4-2313851 (from R4-2312070).**

**R4-2313851 [NR\_newRAT-Core] CR on TS 38.175 IAB reference maintenance R17**

*Type: CR For: Agreement  
 38.175 v17.3.0 CR-0030 rev Cat: F (Rel-17)  
  
 Source: ZTE*

**Decision: Agreed.**

**R4-2312071 [NR\_newRAT-Core] CR on TS 38.175 IAB reference maintenance R16**

*Type: CR For: Agreement  
 38.175 v16.5.0 CR-0031 rev Cat: F (Rel-16)  
  
 Source: ZTE*

**Decision: Revised to R4-2313852 (from R4-2312071).**

**R4-2313852 [NR\_newRAT-Core] CR on TS 38.175 IAB reference maintenance R16**

*Type: CR For: Agreement  
 38.175 v16.5.0 CR-0031 rev Cat: F (Rel-16)  
  
 Source: ZTE*

**Decision: Agreed.**

[NR\_newRAT-Core] CR on TS 38.113

**R4-2312097 [NR\_newRAT-Core] CR on TS 38.113 NR BS reference maintenance R15**

*Type: CR For: Agreement  
 38.113 v15.18.0 CR-0060 rev Cat: F (Rel-15)  
  
 Source: ZTE*

**Decision: Revised to R4-2313853 (from R4-2312097).**

**R4-2313853 [NR\_newRAT-Core] CR on TS 38.113 NR BS reference maintenance R15**

*Type: CR For: Agreement  
 38.113 v15.18.0 CR-0060 rev Cat: F (Rel-15)  
  
 Source: ZTE*

**Decision: Agreed.**

**R4-2312121 [NR\_newRAT-Core] CR on TS 38.113 NR BS reference maintenance R16**

*Type: CR For: Agreement  
 38.113 v16.8.0 CR-0061 rev Cat: A (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Agreed.**

**R4-2312186 [NR\_newRAT-Core] CR on TS 38.113 NR BS reference maintenance R17**

*Type: CR For: Agreement  
 38.113 v17.4.0 CR-0062 rev Cat: A (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Agreed.**

[NR\_newRAT-Core] CR on TS 38.114

**R4-2312203 [NR\_newRAT-Core] CR on TS 38.114 NR repeater general maintenance R17**

*Type: CR For: Agreement  
 38.114 v17.2.0 CR-0006 rev Cat: F (Rel-17)  
  
 Source: ZTE*

**Decision: Revised to R4-2313854 (from R4-2312203).**

**R4-2313854 [NR\_newRAT-Core] CR on TS 38.114 NR repeater general maintenance R17**

*Type: CR For: Agreement  
 38.114 v17.2.0 CR-0006 rev Cat: F (Rel-17)  
  
 Source: ZTE*

**Decision: Agreed.**

### 4.5 Demodulation and CSI requirements

[NR\_newRAT-Perf] CR to TS 38.101-4 on FRC correction

**R4-2313678 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-15)**

*Type: CR For: Agreement  
 38.101-4 v15.18.0 CR-0415 rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon*

Moderator (Axel) flags R4-2313679. Exact same changes as in R4-2313678. Should be Cat A. Updated version already in draft folder.  
Moderator (Axel) flags R4-2313680. Exact same changes as in R4-2313678. Should be Cat A. Updated version already in draft folder.  
Moderator (Axel) flags R4-2313681. Exact same changes as in R4-2313678. Should be Cat A. Updated version already in draft folder.

Apple: **R4-2313678** - This CR is not needed since Table A.3.2.1.1-9, Table A.3.2.1.1-10, A.3.2.1.1-13 to A.3.2.1.1-16 don't exist in R15 spec. Table A.3.2.2.1-1, Table A.3.2.2.1-2 don't exist in R15 spec

**Ercisson:**

**R4-2313678**: Same comment as Apple. This CR is not based on the latest R15 spec: V15.18.0.

**R4-2313679**: This CR is not based on the latest R16 spec: V16.13.

**R4-2313680/R4-2313681**: These CRs should be Cat-A.

**Decision: Revised to R4-2313927 (from R4-2313678).**

**R4-2313927 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-15)**

*Type: CR For: Agreement  
 38.101-4 v15.18.0 CR-0415 rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313679 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-16)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0416 rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313928 (from R4-2313679).**

**R4-2313928 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-16)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0416 rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313680 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0417 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313929 (from R4-2313680).**

**R4-2313929 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0417 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313681 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0418 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

Apple flagged: R4-2313681 -Should be a Cat A CR based on R17 CR.

**Decision: Revised to R4-2313930 (from R4-2313681).**

**R4-2313930 [NR\_newRAT-Perf] CR on correction of FRC definition (TS38.101-4, Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0418 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

[NR\_L1enh\_URLLC-Perf] TS38.101-4 correction to CQI with 1 Tx

**R4-2311202 [NR\_newRAT-Perf] Report quantity parameter setting for CQI reporting with 1Tx**

*Type: other For: Approval  
 38.101-4 v CR- rev Cat: ()  
  
 Source: Anritsu Corporation, Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2311300 [NR\_L1enh\_URLLC-Perf] CR to TS38.101-4 Corrections to CQI Reporting tests with 1TX (Rel-16)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0389 rev Cat: F (Rel-16)  
  
 Source: MediaTek inc.*

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

**R4-2313571 CR to TS38.101-4: Corrections to CQI Reporting tests with 1TX (Rel-16)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0412 rev Cat: F (Rel-16)  
  
 Source: MediaTek*

Apple: R4-2311300 - This issue captured in Anritsu’s paper for clarification with RAN1/2. Wait for reply from RAN1/2 before any update.

Apple: R4-2313571 - Duplicate of 2311300?

Huawei flagged

QC: It’s better to postpone the CR waiting response from RAN1 and RAN2.

Huawei: We share similar view as QC. This CR related to LS with 2 questions.

Nokia: We agree with QC.

Apple: In the specification, we don’t have any CQI-PMI-RI reporting for 1 Tx test. This will bring ambiguity.

Anritsu: At least Keysight, R&S and Anritsu aligned the TE assumption.

**Decision: Postponed.**

**R4-2311301 [NR\_L1enh\_URLLC-Perf] CR to TS38.101-4 Corrections to CQI Reporting tests with 1TX (Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0390 rev Cat: A (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Withdrawn.**

**R4-2311302 [NR\_L1enh\_URLLC-Perf] CR to TS38.101-4 Corrections to CQI Reporting tests with 1TX (Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0391 rev Cat: A (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Withdrawn.**

[NR\_HST] CR to TS 38.101-4

**R4-2311784 [NR\_HST] HST-SFN and HST-DPS model clarification**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0393 rev Cat: F (Rel-16)  
  
 Source: Qualcomm Inc.*

Rohde & Schwarz (Niels) flags R4-2311784: Need for change is not clear and impact on current TCs needs clarification.

Apple: R4-2311784 - Not sure if this change is needed.

Ericsson (Uesaka) flags R4-2311784: We are fine to add a time offset by Delta. However 'vt\_offset' is confusing. Propose to change to 'v x t\_offset'.

MediaTek (Licheng) fl ags the following CRs:R4-2311784 - Same comment as Apple. Not sure if this change is needed.

**Decision: Revised to R4-2313992 (from R4-2311784).**

**R4-2313992 [NR\_HST] HST-SFN and HST-DPS model clarification**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0393 rev Cat: F (Rel-16)  
  
 Source: Qualcomm Inc.*

R&S: We think another alternative solution to address by test procedure. Meanwhile we agree QC the issue need to be fixed.

**Decision: Postponed.**

**R4-2311785 [NR\_HST]HST demod test correction R17 mirror**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0394 rev Cat: A (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Withdrawn.**

**R4-2311786 [NR\_HST]HST demod test correction R18 mirror**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0395 rev Cat: A (Rel-18)  
  
 Source: Qualcomm, Inc.*

**Decision: Withdrawn.**

[NR\_newRAT-Perf , NR\_redcap-Perf] CR to TS 38.101-4 on test applicability

**R4-2312346 [NR\_newRAT-Perf] CR on 38.101-4 general applicablity of demodulation performance requirements (Rel-16)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0398 rev Cat: F (Rel-16)  
  
 Source: Samsung*

Apple: R4-2312346 - This CR is fine, but R17 CR is missing. Should R17 CR include up to 5.1.1.11 ?

Huawei flaged

**Decision: Postponed.**

**R4-2312347 [NR\_redcap-Perf] CR on 38.101-4 general applicablity of demodulation performance requirements (Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0399 rev Cat: F (Rel-17)  
  
 Source: Samsung*

**Decision: Postponed.**

**R4-2312348 [NR\_redcap-Perf] CR on 38.101-4 general applicablity of demodulation performance requirements (Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0400 rev Cat: A (Rel-18)  
  
 Source: Samsung*

**Decision: Withdrawn.**

[NR\_unlic-Perf] CR to TS 38.101-4

**R4-2312500 [NR\_unlic-Perf] Add clarification to simulation parameters for SSB Q Factor (Rel.16 - Cat. F)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0402 rev Cat: F (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Apple: R4-2312500** - Suggestion to change the parameter name to QCL relation between SS/PBCH blocks ( N^QCL\_SSB ) instead of SSB Q-factor and delete note.

**Ercisson flagged**

**Decision: Revised to R4-2313935 (from R4-2312500).**

**R4-2313935 [NR\_unlic-Perf] Add clarification to simulation parameters for SSB Q Factor (Rel.16 - Cat. F)**

*Type: CR For: Agreement  
 38.101-4 v16.13.0 CR-0402 rev Cat: F (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Agreed.**

**R4-2312501 [NR\_unlic-Perf] Add clarification to simulation parameters for SSB Q Factor (Rel.17 - Cat. A)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0403 rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Agreed.**

**R4-2312502 [NR\_unlic-Perf] Add clarification to simulation parameters for SSB Q Factor (Rel.18 - Cat. A)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0404 rev Cat: A (Rel-18)  
  
 Source: Qualcomm Incorporated*

**Decision: Agreed.**

[NR\_L1enh\_URLLC-Perf] CR to TS 38.141-1/-2

**R4-2312057 [NR\_L1enh\_URLLC-Perf] CR for adding optional statement for URLLC demodulation requirements**

*Type: CR For: Agreement  
 38.141-1 v16.16.0 CR-0365 rev Cat: F (Rel-16)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

Add manufacture declarations and applicability rule for URLLC requirements

Huawei flagged

Nokia flagged

**Decision: Revised to R4-2313936 (from R4-2312057).**

**R4-2313936 [NR\_L1enh\_URLLC-Perf] CR for adding optional statement for URLLC demodulation requirements**

*Type: CR For: Agreement  
 38.141-1 v16.16.0 CR-0365 rev Cat: F (Rel-16)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2312058 CR for TS38.141-1 add declaration and applicability rule for URLLC requirements**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0366 rev Cat: A (Rel-17)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2312059 CR for TS38.141-1 add declaration and applicability rule for URLLC requirements**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0367 rev Cat: A (Rel-18)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2312060 [NR\_L1enh\_URLLC-Perf] CR for adding optional statement for URLLC demodulation requirements**

*Type: CR For: Agreement  
 38.141-2 v16.16.0 CR-0528 rev Cat: F (Rel-16)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

Huawei flagged

**Decision: Revised to R4-2313937 (from R4-2312060).**

**R4-2313937 [NR\_L1enh\_URLLC-Perf] CR for adding optional statement for URLLC demodulation requirements**

*Type: CR For: Agreement  
 38.141-2 v16.16.0 CR-0528 rev Cat: F (Rel-16)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2312061 CR for TS38.141-2 add declaration and applicability rule for URLLC requirements**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0529 rev Cat: A (Rel-17)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2312062 CR for TS38.141-2 add declaration and applicability rule for URLLC requirements**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0530 rev Cat: A (Rel-18)  
  
 Source: Ericsson, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2312444 [NR\_L1enh\_URLLC-Perf] CR to 38.141-1: Correction on BLER test requirement R16**

*Type: CR For: Agreement  
 38.141-1 v16.16.0 CR-0371 rev Cat: F (Rel-16)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Agreed.**

**R4-2313556 [NR\_L1enh\_URLLC-Perf] CR to 38.141-1: Correction on BLER test requirement R17**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0374 rev Cat: A (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Agreed.**

**R4-2313557 [NR\_L1enh\_URLLC-Perf] CR to 38.141-1: Correction on BLER test requirement R18**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0375 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Agreed.**

**R4-2312445 [NR\_L1enh\_URLLC-Perf] CR to 38.141-1: Correction on BLER test requirement R17**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0372 rev Cat: A (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

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

**R4-2312446 [NR\_L1enh\_URLLC-Perf] CR to 38.141-1: Correction on BLER test requirement R18**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0373 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd*

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

[NR\_IAB-Perf] CR for TS 38.174

**R4-2312799 [NR\_IAB-Perf] CR for TS 38.174 FRC Correction in PDCCH Table (NR\_IAB, Rel-16, CAT F)**

*Type: CR For: Agreement  
 38.174 v16.8.0 CR-0063 rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged (with R4-2313668).**

**R4-2312800 [NR\_IAB-Perf] CR for TS 38.174 FRC Correction in PDCCH Table (NR\_IAB, Rel-17, CAT A)**

*Type: CR For: Agreement  
 38.174 v17.4.0 CR-0064 rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Withdrawn.**

**R4-2312801 [NR\_IAB-Perf] CR for TS 38.174 FRC Correction in PDCCH Table (NR\_IAB, Rel-18, CAT A)**

*Type: CR For: Agreement  
 38.174 v18.1.0 CR-0065 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Withdrawn.**

**R4-2313668 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS36.174, Rel-16)**

*Type: CR For: Agreement  
 38.174 v16.8.0 CR-0070 rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313938 (from R4-2313668).**

**R4-2313938 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS36.174, Rel-16)**

*Type: CR For: Agreement  
 38.174 v16.8.0 CR-0070 rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313669 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS38.174, Rel-17)**

*Type: CR For: Agreement  
 38.174 v17.4.0 CR-0071 rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313670 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS38.174, Rel-18)**

*Type: CR For: Agreement  
 38.174 v18.1.0 CR-0072 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313671 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS36.176-1, Rel-16)**

*Type: CR For: Agreement  
 38.176-1 v16.6.0 CR-0028 rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313672 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS38.176-1, Rel-17)**

*Type: CR For: Agreement  
 38.176-1 v17.5.0 CR-0029 rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313673 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS38.176-1, Rel-18)**

*Type: CR For: Agreement  
 38.176-1 v18.1.0 CR-0030 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313674 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS36.176-2, Rel-16)**

*Type: CR For: Agreement  
 38.176-2 v16.6.0 CR-0031 rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313675 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS38.176-2, Rel-17)**

*Type: CR For: Agreement  
 38.176-2 v17.5.0 CR-0032 rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313676 [NR\_IAB-Perf] CR on NR IAB performance requirements (TS38.176-2, Rel-18)**

*Type: CR For: Agreement  
 38.176-2 v18.1.0 CR-0033 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

### 4.6 OTA and TRP/TRS test aspects

### 4.7 Moderator summary and conclusion

## 5 Rel-17 maintenance for LTE and NR

The following contributions have been moved and will be treatedi n the respective topic threads.

*For Rel-17 maintenance, please submit formal CRs. When you reserve the tdoc number, please use the correct WI code rather than simply using TEI and fill the column of “Related WIs” in your reservation spreadsheet. If you submit a CR with TEI as WI code, please inform session chair.*

*The contributions corresponding to incoming LS for Rel-18, Rel-17 are expected to be submitted in AI 10.1 and AI 10.2.*

*When submitting contributions to AI 5, please add [WI\_code] in the beginning of titles for both discussion files and CRs to facilitate handling of moderators and session chairs.*

### 5.2 Rel-17 non-spectrum related WI maintenance

#### 5.2.1 BS RF requirements

[NR\_NTN\_solutions-Core] CR to TS 38.108/181 correction on antenna connector

**R4-2311596 CR for TS 38.108, Correction on antenna connector**

*Type: CR For: Agreement  
 38.108 v17.4.0 CR-0038 rev Cat: F (Rel-17)  
  
 Source: CATT*

**Decision: Agreed.**

**R4-2311597 CR for TS 38.181, Correction on antenna connector**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0004 rev Cat: F (Rel-17)  
  
 Source: CATT*

**Decision: Agreed.**

[NR\_NTN\_solutions-Core] CR to TS 38.108/181 correction OOBE

**R4-2311598 CR for TS 38.108, Correction on out-of-band emissions**

*Type: CR For: Agreement  
 38.108 v17.4.0 CR-0039 rev Cat: F (Rel-17)  
  
 Source: CATT, THALES*

**Decision: Postponed.**

**R4-2313959 CR for TS 38.108, Correction on out-of-band emissions**

*Type: CR For: Agreement  
 38.108 v17.4.0 CR-0039 rev Cat: F (Rel-17)  
  
 Source: CATT, THALES*

**Decision: Withdrawn.**

**R4-2311599 CR for TS 38.181, Correction on out-of-band emissions**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0005 rev Cat: F (Rel-17)  
  
 Source: CATT*

Ericsson flags R4-2311599 and R4-2311700: New SAN BW definitions should be better aligned with NR and LTE BS.

NEC flags on R4-2311599. To be discussed with R4-2311700. Difference between "SAN total assigned bandwidth" and "SAN transponder bandwidth" is not clear." SAN total assigned bandwidth" is not used in the document.Title for table 6.6.4.5-1.Table 6.6.4.5-1, Note 1, "where ...." (???) Reference in table 6.6.4.5-1, Note3.

**Decision: Revised to R4-2313960 (from R4-2311599).**

**R4-2313960 CR for TS 38.181, Correction on out-of-band emissions**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0005 rev Cat: F (Rel-17)  
  
 Source: CATT*

**Decision: Agreed.**

**R4-2311700 CR to 38.181: Out-of-band emissions requirements**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0006 rev Cat: F (Rel-17)  
  
 Source: NEC*

CATT: Flag to NEC R4-2311700. There're some overlapping with CATT CR R4-2311599. Maybe both of them can be revised then split the corrections after the discussion.

**Decision: Revised to R4-2313961 (from R4-2311700).**

**R4-2313961 CR to 38.181: Out-of-band emissions requirements**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0006 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision: Agreed.**

**R4-2311701 CR to 38.108: Application of unwanted emissions requirements**

*Type: CR For: Agreement  
 38.108 v17.4.0 CR-0040 rev Cat: F (Rel-17)  
  
 Source: NEC*

Ericsson flags R4-2311701 and R4-2311702: Avoid using “unless otherwise stated”, better to state explicitly where it applies/does not apply.

**Decision: Revised to R4-2313962 (from R4-2311701).**

**R4-2313962 CR to 38.108: Application of unwanted emissions requirements**

*Type: CR For: Agreement  
 38.108 v17.4.0 CR-0040 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision: Agreed.**

**R4-2311702 CR to 38.181: Applicaiton of unwanted emissions requirements**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0007 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision: Revised to R4-2313963 (from R4-2311702).**

**R4-2313963 CR to 38.181: Applicaiton of unwanted emissions requirements**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0007 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision: Agreed.**

[NR\_NTN\_solutions-Perf] CR to TS 38.181 correction of interfering signal

**R4-2311703 CR to 38.181: Characteristic of interfering signal**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0008 rev Cat: F (Rel-17)  
  
 Source: NEC*

**Decision: Agreed.**

[NR\_repeaters] CR to 38.106 on transient period

**R4-2311711 CR to 38.106: Editorial correction in transmitter transient period for NR repeaters**

*Type: CR For: Agreement  
 38.106 v18.1.0 CR-0037 rev Cat: F (Rel-18)  
  
 Source: NEC*

**Decision: Agreed.**

[NR\_repeaters] CR to 38.106/115-1/115-2 on Input intermodulation

**R4-2312329 [NR\_repeaters] CR to 38.106: Input intermodulation**

*Type: CR For: Agreement  
 38.106 v17.5.0 CR-0038 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

NEC flags on R4-2312329, 331, 333. If “transmitter ON period” is used with Italic font, it should be added in the definition section. For 12329, it is proposed to correct the table number error in 6.7.1.2. (in the current text)

**Decision: Revised to R4-2313964 (from R4-2312329).**

**R4-2313964 [NR\_repeaters] CR to 38.106: Input intermodulation**

*Type: CR For: Agreement  
 38.106 v17.5.0 CR-0038 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2312330 [NR\_repeaters] CR to 38.106: Input intermodulation**

*Type: CR For: Agreement  
 38.106 v18.1.0 CR-0039 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2312331 [NR\_repeaters] CR to 38.115-1: Input intermodulation**

*Type: CR For: Agreement  
 38.115-1 v17.2.0 CR-0016 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313965 (from R4-2312331).**

**R4-2313965 [NR\_repeaters] CR to 38.115-1: Input intermodulation**

*Type: CR For: Agreement  
 38.115-1 v17.2.0 CR-0016 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2312332 [NR\_repeaters] CR to 38.115-1: Input intermodulation**

*Type: CR For: Agreement  
 38.115-1 v18.1.0 CR-0017 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2312333 [NR\_repeaters] CR to 38.115-2: Input intermodulation**

*Type: CR For: Agreement  
 38.115-2 v17.2.0 CR-0008 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313966 (from R4-2312333).**

**R4-2313966 [NR\_repeaters] CR to 38.115-2: Input intermodulation**

*Type: CR For: Agreement  
 38.115-2 v17.2.0 CR-0008 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

[NR\_FR1\_35MHz\_45MHz\_BW-Core] CR to TS 38.141-2

**R4-2312447 [NR\_FR1\_35MHz\_45MHz\_BW-Core] CR to 38.141-2: Correction on EVM window length table R17**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0535 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Agreed.**

**R4-2312448 [NR\_FR1\_35MHz\_45MHz\_BW-Core] CR to 38.141-2: Correction on EVM window length table R18**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0536 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd*

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

**R4-2313558 [NR\_FR1\_35MHz\_45MHz\_BW-Core] CR to 38.141-2: Correction on EVM window length table R18**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0539 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Agreed.**

[NR\_IAB\_enh-Core] CR to TS 38.174

**R4-2311566 [NR\_IAB\_enh-Core] CR to TS 38.174: Addition of missing bands for IAB co-existence and co-location requirements**

*Type: CR For: Agreement  
 38.174 v17.4.0 CR-0055 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

Session chair note: R4-2311566~569 move to this AI from AI 5.2.

**Decision: Agreed.**

**R4-2311567 [NR\_IAB\_enh-Core] CR to TS 38.174: Addition of missing bands for IAB co-existence and co-location requirements**

*Type: CR For: Agreement  
 38.174 v18.1.0 CR-0056 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

[NR\_6GHz-Core] CR to TS 38.104

**R4-2311568 [NR\_6GHz-Core] CR to TS 38.104 on receiver requirements for 100MHz channel bandwidth**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0498 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

Ericsson flags R4-2311568: Many TBDs, CR should be postponed until those are resolved.

Huawei: This is for NR-U, not for NR\_6GHz, wrong WID code used.

**Decision: Postponed.**

**R4-2311569 [NR\_6GHz-Core] CR to TS 38.104 on receiver requirements for 100MHz channel bandwidth**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0499 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Withdrawn.**

#### 5.2.4 Demodulation and CSI requirements

[NR\_DL1024QAM\_FR1-Perf] CR to TS 38.101-4

**R4-2311087 CR to 38.101-4: Corrections to channel model parameters for FR1 (Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0385 rev Cat: F (Rel-17)  
  
 Source: MediaTek*

**Decision: Agreed.**

**R4-2311088 CR to 38.101-4: Corrections to channel model parameters for FR1 (Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0386 rev Cat: A (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Agreed.**

[NR\_demod\_enh2-Perf, NR\_redcap-Perf] CR to TS 38.101-4

**R4-2311207 [NR\_demod\_enh2-Perf, NR\_redcap-Perf] CR to PDSCH requirements and RMCs for SCS 30kHz FR1**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0387 rev Cat: F (Rel-17)  
  
 Source: Anritsu Corporation*

**Decision: Agreed.**

**R4-2311208 [NR\_demod\_enh2-Perf, NR\_redcap-Perf] CR to PDSCH requirements and RMCs for SCS 30kHz FR1**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0388 rev Cat: A (Rel-18)  
  
 Source: Anritsu Corporation*

**Decision: Agreed.**

[NR\_redcap-Perf] CR to TS 38.101-4

**R4-2312503 [NR\_redcap-Perf] Align Measurement channel to test rank in CQI Redcap tests (Rel.17 - Cat F)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0405 rev Cat: F (Rel-17)  
  
 Source: Qualcomm Incorporated*

Ericsson flagged: **R4-2312503**: RedCap CQI reporting test with fading condition uses CQI table 1. So we should refer to Table A.4-1 TBS.1-3 (instead of TBS.1-4).

**Decision: Revised to R4-2313939 (from R4-2312503).**

**R4-2313939 [NR\_redcap-Perf] Align Measurement channel to test rank in CQI Redcap tests (Rel.17 - Cat F)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0405 rev Cat: F (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Agreed.**

**R4-2312504 [NR\_redcap-Perf] Align Measurement channel to test rank in CQI Redcap tests (Rel.18 - Cat A)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0406 rev Cat: A (Rel-18)  
  
 Source: Qualcomm Incorporated*

**Decision: Agreed.**

[NR\_HST\_FR2-Perf] CR to TS 38.101-4

**R4-2312786 [NR\_HST\_FR2-Perf] CR: Correction of FRC for FR2 HST-DPS UE demodulation requirements**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0407 rev Cat: F (Rel-17)  
  
 Source: Ericsson, Anritsu*

Nokia flagged R4-2312786. Overlap with R4-2312217/R4-2312215, DM-RS/TRS change?

QC flagged R4-2312786 I would like to have a clarification on the Binary Channel Bits Per Slot computation to get some insights into why my results don't match

**Decision: Merged (with R4-2312215).**

**R4-2312787 [NR\_HST\_FR2-Perf] CR: Correction of FRC for FR2 HST-DPS UE demodulation requirements**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0408 rev Cat: A (Rel-18)  
  
 Source: Ericsson, Anritsu*

**Decision: Withdrawn.**

**R4-2312215 Correction CR on Rel-17 FR2 HST test setup and FRC**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0396 rev Cat: F (Rel-17)  
  
 Source: Samsung*

*Huawei flagged*

*Nokia flagged R*4-2312215: Overlap with R4-2312786. Can R4-2312786 be merged into R4-2312215?

Ericsson/Anritsu flagged

QC flagged **R4-2312215** Correction CR on Rel-17 FR2 HST test setup and FRC Samsung **--** Schedule TRS in symbol#1 to avoid conflict with 3rd DMRS in Sym#9 - doesn't this have a conflict with PDCCH? An alternative could be to disable PDSCH in TRS slots?

**Decision: Revised to R4-2313933 (from R4-2312215).**

**R4-2313933 Correction CR on Rel-17 FR2 HST test setup and FRC**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0396 rev Cat: F (Rel-17)  
  
 Source: Samsung, Ericsson, Anritsu, Cybercore*

**Decision: Agreed.**

**R4-2312216 Correction CR on Rel-17 FR2 HST test setup and FRC**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0397 rev Cat: A (Rel-18)  
  
 Source: Samsung, Ericsson, Anritsu, Cybercore*

**Decision: Agreed.**

**R4-2312217 FRC and simulation assumption correction for Rel-17 FR2 HST**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

[NR\_HST\_FR1\_enh-Perf] CR to TS 38.101-4

**R4-2313666 [NR\_HST\_FR1\_enh-Perf] CR on HST-SFN CA UE capability (TS38.101-4, Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0413 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

Ericsson flagged R4-2313666: We are open to clarify the applicability. If we change, in Table 5.1.1.7.4-2, test list of TDD 30 kHz + TDD 30 kHz CA should be Table 5.2A.2.4-4 and Table 5.2A.3.4-4 (instead of Tables 5.2A.2.4-3 and 5.2A.3.4-3).

**Decision: Revised to R4-2313931 (from R4-2313666).**

**R4-2313931 [NR\_HST\_FR1\_enh-Perf] CR on HST-SFN CA UE capability (TS38.101-4, Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0413 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313667 [NR\_HST\_FR1\_enh-Perf] CR on HST-SFN CA UE capability (TS38.101-4, Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0414 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

[NR\_NTN\_solutions-Perf] CR to TS 38.101-5

**R4-2311298 [NR\_NTN\_solutions-Perf] CR to TS38.101-5: Corrections to NR-NTN requirements (Rel-17)**

*Type: CR For: Agreement  
 38.101-5 v17.4.0 CR-0027 rev Cat: F (Rel-17)  
  
 Source: MediaTek inc.*

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

**R4-2313572 CR to TS38.101-5: Corrections to NR-NTN requirements (Rel-17)**

*Type: CR For: Agreement  
 38.101-5 v17.4.0 CR-0032 rev Cat: F (Rel-17)  
  
 Source: MediaTek*

*Nokia flagged:* R4-2313572: Corresponding cat-A seems to be missing.

*Apple flagged: Apple (Manasa) flags* ***R4-2313572*** *Duplicate CR – same as R4-2311298*

*QC flagged R4-2313572, R4-2311299 (Cat A)*

**Decision: Revised to R4-2313940 (from R4-2313572).**

**R4-2313940 CR to TS38.101-5: Corrections to NR-NTN requirements (Rel-17)**

*Type: CR For: Agreement  
 38.101-5 v17.4.0 CR-0032 rev Cat: F (Rel-17)  
  
 Source: MediaTek*

**Decision: Agreed.**

**R4-2311299 CR to TS38.101-5: Corrections to NR-NTN requirements (Rel-18)**

*Type: CR For: Agreement  
 38.101-5 v18.2.0 CR-0028 rev Cat: A (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Agreed.**

**R4-2312056 [NR\_NTN\_solutions-Perf] CR for channel model description in SAN PRACH demodulation requirement**

*Type: CR For: Agreement  
 38.108 v17.4.0 CR-0042 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

[NR\_cov\_enh-Perf] Correction to TS 38.141-1/-2

**R4-2312220 Update to Test Case 8.2.13 (FDD case, PUSCH Aggregation Factor 8), Rel17, 38.141-2**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0531 rev Cat: F (Rel-17)  
  
 Source: ROHDE & SCHWARZ*

Session chair note: Move to this AI from AI 4.2.

**Decision: Agreed.**

**R4-2312270 Update to Test Case 8.2.13 (FDD case, PUSCH Aggregation Factor 8), Rel18, 38.141-2**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0532 rev Cat: A (Rel-18)  
  
 Source: ROHDE & SCHWARZ*

**Decision: Agreed.**

**R4-2311973 Update to Test Case 8.2.13 (FDD case, PUSCH Aggregation Factor 8), Rel17, 38.141-1**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0361 rev Cat: F (Rel-17)  
  
 Source: ROHDE & SCHWARZ*

Session chair note: Move to this AI from AI 4.2.

**Decision: Agreed.**

**R4-2312001 Update to Test Case 8.2.13 (FDD case, PUSCH Aggregation Factor 8), Rel18, 38.141-1**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0362 rev Cat: A (Rel-18)  
  
 Source: ROHDE & SCHWARZ*

**Decision: Agreed.**

[NR\_cov\_enh-Perf] CR to TS 38.104/141-1/141-2 TBoMS

**R4-2312052 [ CR for configuration of FR1 PUSCH TBoMS demodulation requirement**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0504 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR correct the number of slot repetition in configuration

**Decision: Agreed.**

**R4-2312053 CR for TS38.104 correction for TBoMS configuration**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0505 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

The CR correct the number of slot repetition in configuration

**Decision: Agreed.**

**R4-2312054 [NR\_cov\_enh-Perf] CR for configuration of FR1 PUSCH TBoMS demodulation requirement**

*Type: CR For: Agreement  
 38.141-1 v17.10.0 CR-0363 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR correct the number of slot repetition in configuration

**Decision: Agreed.**

**R4-2312055 CR for TS38.141-1 correction for TBoMS configuration**

*Type: CR For: Agreement  
 38.141-1 v18.2.0 CR-0364 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

The CR correct the number of slot repetition in configuration

**Decision: Agreed.**

[NR\_ext\_to\_71GHz-Perf]

**R4-2313582 [NR\_ext\_to\_71GHz-Perf] CR to TS 38.141-2: propagation conditions annex J reference corrections, Rel-17**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0541 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

Session chair note: Move to this AI from AI 5.1.3

**Decision: Agreed.**

**R4-2313583 [NR\_ext\_to\_71GHz-Perf] CR to TS 38.141-2: propagation conditions annex J reference corrections, Rel-18**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0542 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

[NR\_NTN\_solutions-Perf] CR to TS 38.181

**R4-2313677 [NR\_NTN\_solutions-Perf] CR on NTN SAN performance requirements (TS38.181, Rel-17)**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0009 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2313837 [NR\_NTN\_solutions-Perf] CR on NTN SAN performance requirements (TS38.181, Rel-17)**

*Type: CR For: Agreement  
 38.181 v17.1.0 CR-0010 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

#### 5.2.5 OTA and TRP/TRS test aspects

FS\_FR2\_enhTestMethods

**R4-2311231 Measurement Grids for Optional 6x2 PC3 Antenna Array Configuration**

*Type: discussion For: Decision  
 Source: Apple*

**Decision: Noted.**

[NR\_MIMO\_OTA] CR to TS 38.151

**R4-2312573 [NR\_MIMO\_OTA] CR to TS38.151 on Definitions of terms**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0013 rev Cat: F (Rel-17)  
  
 Source: vivo*

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

**R4-2312927 On FR1 requirement metric**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2312928 CR to TS 38.151 on FR1 and FR2 requirement**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0014 rev Cat: F (Rel-17)  
  
 Source: OPPO*

**Decision: Not pursued.**

**R4-2313227 [NR\_MIMO\_OTA] CR on TS38.151 on FR2 power validation passfail limit**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0015 rev Cat: F (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision: Not pursued.**

**R4-2313575 CR to TS 38.151 on Definitions of terms**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0017 rev Cat: F (Rel-17)  
  
 Source: vivo*

**Decision: Agreed.**

#### 5.2.6 Extending current NR operation to 71GHz

##### 5.2.6.1 MU budget for FR2-2

**R4-2311660 Proposals on measurement uncertainties of BS OTA transmitter requirements for extending current NR operation to 71 GHz**

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

**Decision:** The document was **revised to R4-2313453**.

**R4-2313453 Proposals on measurement uncertainties of BS OTA transmitter requirements for extending current NR operation to 71 GHz**

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

(Replaces R4-2311660)

**Decision: Noted.**

**R4-2313234 FR2-2 BS MU and remaining issues for BS conformance testing**

*Type: other For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision: Noted.**

##### 5.2.6.2 BS RF requirements and conformance testing

[NR\_ext\_to\_71GHz-Perf] CR to TS 38.141-2

**R4-2311709 CR to 38.141-2: Measurement uncertainty for OBW in FR2-2 (Rel-17)**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0526 rev Cat: F (Rel-17)  
  
 Source: NEC*

Nokia: This is not related ongoing MU discussion. How the vale come from?

Ericsson: We have some discussion during core requirements.

**Decision: Postponed.**

**R4-2311710 CR to 38.141-2: Measurement uncertainty for OBW in FR2-2 (Rel-18)**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0527 rev Cat: A (Rel-18)  
  
 Source: NEC*

**Decision: Withdrawn.**

**R4-2312373 CR to TS 38.141-2: Correction of MU for ACLR, OBUE and Spurious emission for NR operation up to 71 GHz in Subclause 4.1.2.2, 4.1.2.3, 6.7.3.5.2, 6.7.4.5.2 and Annex C.1**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0533 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Merged (with R4-231xxxx).**

**R4-2312374 CR to TS 38.141-2: Correction of MU for ACLR, OBUE and Spurious emission for NR operation up to 71 GHz**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0534 rev Cat: A (Rel-18)  
  
 Source: Ericsson*

**Decision: Withdrawn.**

**R4-2311661 CR to TS 38.141-2 on completion of measurement uncertainties for extending current NR operation to 71GHz**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0524 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2313856 (from R4-2311661).**

**R4-2313856 CR to TS 38.141-2 on completion of measurement uncertainties for extending current NR operation to 71GHz**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0524 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell, Ericsson, Huawei, NEC, Keysight, R&S*

**Decision: Agreed.**

**R4-2311662 CR to TS 38.141-2 on completion of measurement uncertainties for extending current NR operation to 71GHz**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0525 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2313857 (from R4-2311662).**

**R4-2313857 CR to TS 38.141-2 on completion of measurement uncertainties for extending current NR operation to 71GHz**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0525 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell, Ericsson, Huawei, NEC, Keysight, R&S*

**Decision: Agreed.**

**R4-2313236 [NR\_ext\_to\_71GHz-Perf] CR to 38.141-2: 71 GHz Extension BS conformance test MU update R17**

*Type: CR For: Agreement  
 38.141-2 v17.10.0 CR-0537 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Merged (with R4-231xxxx).**

**R4-2313237 [NR\_ext\_to\_71GHz-Perf] CR to 38.141-2: 71 GHz Extension BS conformance test MU update R18**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0538 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd*

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

**R4-2313559 [NR\_ext\_to\_71GHz-Perf] CR to 38.141-2: 71 GHz Extension BS conformance test MU update R18**

*Type: CR For: Agreement  
 38.141-2 v18.2.0 CR-0540 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Withdrawn.**

[NR\_ext\_to\_71GHz-Perf] CR to TR 37.941

**R4-2313235 [NR\_ext\_to\_71GHz-Perf] CR to 37.941: 71 GHz Extension BS conformance test MU update**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0044 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Revised to R4-2313860 (from R4-2313235).**

**R4-2313860 [NR\_ext\_to\_71GHz-Perf] CR to 37.941: 71 GHz Extension BS conformance test MU update**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0044 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd, Ericsson*

**Decision: Agreed.**

**R4-2312370 CR to TR 37.941: Addition of technical background related to additional power level calibration in subclause 7.3.1, 8.3 and 8.8**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0040 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Revised to R4-2313858 (from R4-2312370).**

**R4-2313858 CR to TR 37.941: Addition of technical background related to additional power level calibration in subclause 7.3.1, 8.3 and 8.8**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0040 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2312371 CR to TR 37.941: Addition of FR2-2 MU evaluation for EIRP measured in CATR in subclause 9.2 and 9.3**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0041 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Not pursued.**

**R4-2313859 CR to TR 37.941: Addition of FR2-2 MU evaluation for EIRP measured in CATR in subclause 9.2 and 9.3**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0041 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Withdrawn.**

**R4-2312372 CR to TR 37.941: Addition of FR2-2 MU evaluation for TRP in RC in subclause 11.2, 11.3, 11.4 and 12.2**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0042 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Decision: Merged (with R4-231xxxx).**

**R4-2313810 CR to TR 37.941: implementation of FR2-2 MU and TT derivations, Rel-17**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0049 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313861 (from R4-2313810).**

**R4-2313861 CR to TR 37.941: implementation of FR2-2 MU and TT derivations, Rel-17**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0049 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313989 (from R4-2313861).**

**R4-2313989 CR to TR 37.941: implementation of FR2-2 MU and TT derivations, Rel-17**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0049 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313811 CR to TR 37.941: implementation of FR2-2 MU and TT derivations, Rel-18**

*Type: CR For: Agreement  
 37.941 v17.1.0 CR-0050 rev Cat: A (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2313814 CR content to TR 37.941: implementation of FR2-2 MU and TT derivations, Rel-17**

*Type: other For: Agreement  
 37.941 v CR- rev Cat: (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

##### 5.2.6.5 Demodulation and CSI requirements

[NR\_ext\_to\_71GHz-Perf] CR on 38.104

**R4-2313275 [NR\_ext\_to\_71GHz-Perf] CR on 38.104: Clean up the brackets for FR2-2 PUSCH requirements**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0513 rev Cat: F (Rel-17)  
  
 Source: Huawei,HiSilicon, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313276 [NR\_ext\_to\_71GHz-Perf] CR on 38.104 Clean up the brackets for FR2-2 PUSCH requirements (Rel-18)**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0514 rev Cat: A (Rel-18)  
  
 Source: Huawei,HiSilicon, Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313407 NR\_ext\_to\_71GHz CR 38.104 demodulation requirements**

*Type: CR For: Agreement  
 38.104 v17.10.0 CR-0515 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged (with R4-2313275).**

**R4-2313408 NR\_ext\_to\_71GHz CR 38.104 demodulation requirements**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0516 rev Cat: A (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged (with R4-2313275).**

[NR\_ext\_to\_71GHz-Perf] CR on 38.101-4

**R4-2313277 [NR\_ext\_to\_71GHz-Perf] CR on 38.101-4 Update TDD UL-DL configuration for FR2-2 480kHz SCS (Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0410 rev Cat: F (Rel-17)  
  
 Source: Huawei,HiSilicon*

**Decision: Revised to R4-2313932 (from R4-2313277).**

**R4-2313932 [NR\_ext\_to\_71GHz-Perf] CR on 38.101-4 Update TDD UL-DL configuration for FR2-2 480kHz SCS (Rel-17)**

*Type: CR For: Agreement  
 38.101-4 v17.9.0 CR-0410 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

**R4-2313278 [NR\_ext\_to\_71GHz-Perf] CR on 38.101-4 Update TDD UL-DL configuration for FR2-2 480kHz SCS (Rel-18)**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0411 rev Cat: A (Rel-18)  
  
 Source: Huawei,HiSilicon*

**Decision: Agreed.**

### 5.4 Moderator summary and conclusions (for Agenda 5)

**Topic for [108][301] BSRF\_maintenance, AI 4.2, 5.2.1, 6 (R4-2311663)**

**R4-2314237 Topic summary for [108][301] BSRF\_maintenance**

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

**Decision: Noted.**

**[108][317] Demod\_Maintenance, AI 4.5, 5.2.6.5, 5.2.4**

**R4-2314253 Topic summary for [108][317] Demod\_Maintenance**

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

**Decision: Noted.**

**R4-2313934 LS on report quantity parameter setting for CQI reporting with 1Tx**

*Type: LSout For: Approval*

*To RAN1, RAN2  
 Source:* Anritsu

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2313998 (from R4-2313934).**

**R4-2313998 LS on report quantity parameter setting for CQI reporting with 1Tx**

*Type: LSout For: Approval*

*To RAN1, RAN2  
 Source:* Anritsu

**Abstract:**

**Discussion:**

**Decision: Approved.**

**Topic for [108][302] NR\_ext\_to\_71GHz\_BSRF\_Maintenance, AI 5.2.6.1, 5.2.6.2**

**R4-2314238 Topic summary for [108][302] NR\_ext\_to\_71GHz\_BSRF\_Maintenance**

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

**Decision: Noted.**

**Sub-topic 1-1: C1-7 (RF power measurement equipment (e.g. spectrum analyzer, power meter) - low power (UEM, absolute ACLR))**

* Proposals (not mutually exclusive)
  + Option 1: To merge C1-7 and C1-7\_mixer rows for in-band measurement. (R4-2313453, Nokia)
  + Option 2: To use 2.0 dB for C1-7 for in-band measurement of 52.6 < f < 71GHz. (R4-2313453, Nokia)
  + Option 3: merge C1-7 and C-1-7\_mixer then use 2.0 (1 sigma) as value. Also, add “mixer” in UID description as follows: *C1-7 RF power measurement equipment (e.g. spectrum analyzer, power meter, mixer) – low power (UEM, absolute ACLR)* (R4-2313234, Keysight Technologies UK Ltd)
* Agreement:
  + To merge C1-7 and C1-7\_mixer rows for in-band measurement, with the updated UID description:
    - *C1-7 RF power measurement equipment (e.g. spectrum analyzer, power meter, mixer) – low power (UEM, absolute ACLR)*

**Sub-topic 1-2: LNA MU**

* Proposals
  + Option 1: Not to include additional LNA MU for low level requirements. (R4-2313453, Nokia)
  + Option 2: LNA is necessary for ACLR/OBUE measurement because of link budget with CATR chamber (R4-2313234, Keysight Technologies UK Ltd)
* Discussion:
  + Nokia: This issue has discussed several times without any update on the situation. We would like to conclude on this.
  + Ericsson: We share similar view as Nokia. We didn’t see the needs for LNA on ACLR/OBUE measurement.
  + Huawei: We target to finalize all reaming issues on FR 2-2.
* Agreement: RAN4 aims to conclude MU for FR2-2 by RAN#108 meeting
  + No further discussion on LNA usage assumption after RAN#108 meeting.

**Sub-topic 1-3: Switching uncertainty MU**

* Proposals
  + Option 1: To use 0.25 dB for the Switching uncertainty MU for in-band TRP requirement. (R4-2313453, Nokia)
  + Option 1: Use already agreed value for frequency range of 40G~60G for f ~ 71 GHz, 0.25 (1-sigma) (R4-2313234, Keysight Technologies UK Ltd)
* Agreement: A2-11 (Switching uncertainty) for CATR inband TRP measurement; 52.6 < f < 71GHz: 0.25 dB

**Sub-topic 1-4: Tx OFF requirement**

* Proposals
  + Option 1: Not to include additional LNA MU in the TX OFF requirement. (R4-2313453, Nokia)
  + Option 2: No need LNA for Tx Off power measurement. (R4-2313234, Keysight Technologies UK Ltd)
* Discussion:
  + Nokia: On issue 1-4, no LNA needed meanwhile for issue 1-2, Keysight announced LNA needed. It seems strange for us.
  + Keysight: These two requirements are different and we should discuss separately.
  + Ericsson: We share similar view as Nokia.
* Agreement: No LNA for TX OFF MU budget.

**Sub-topic 1-5: EVM requirement**

* Proposals
  + Option 1: To use EVM MU value of 1.0%. (R4-2313453, Nokia)
  + Option 2: EVM MU for FR2-2, 1.1% (R4-2313234, Keysight Technologies UK Ltd)
* Discussion:
  + Keysight: Please take TE vendors’ feedback into consideration.
  + Nokia: We would like to conclude this issue.
  + Huawei: This value related to duration length. Is that possible we can take 1% if we can increase the collected frame for EVM measurement.
  + Ericsson: We need to keep in mind, if we change the measurement length, this should help for decrease MU.
  + Keysight: The length has no impact on MU based on our previous analysis. This MU increased due to larger bandwidth and higher frequency range.

**Sub-topic 1-6: inband TRP requirement**

* Proposals
  + Option 1: For inband TRP, in order to use reduced MU for power measurement equipment, calibration procedure described in this document should be used. (R4-2313234, Keysight Technologies UK Ltd)
* Discussion:
  + NEC: We have concern on option1. This should be one of possible procedure, we should not mandate any of procedures.
  + Huawei: We already follow the principle for MU.
* Agreement: Option 1 agreed as one possible procedure; further work on the CR drafting.

**Sub-topic 1-9: Spurious emissions requirement**

* Proposals
  + Option 1: To use 2.0 dB for the missing MU value for the range 60 < f ≤ 71 GHz in the C1-7 row for spurious emission measurements. (R4-2313453, Nokia)
  + Option 2: For spurious emission measurement, value for “60 < f ≤ 71 GHz C1-7” is 2.0 (1 sigma), there is already agreed number. (R4-2313234, Keysight Technologies UK Ltd)
  + Option 3: For spurious emissions, which requirement defines with measurement bandwidth, need to use spectrum analyzer MU for power measurement equipment MU. Reduced MU (with use of power sensor) as for inband TRP is not feasible for those measurement. (R4-2313234, Keysight Technologies UK Ltd)
* Discussion:
  + Keysight: There is a missing gap for FR2-2.
* Agreement: C1-7 for [60 < f ≤ 71 GHz]: 2.0 dB (1 sigma)

**R4-2313855 WF for FR2-2 MU**

*Type: other For: Approval  
 Source: Huawei*

**Discussion:**

**Decision: Approved.**

## 6 Rel-18 maintenance for LTE and NR

**R4-2311663 [FS\_NR\_BS\_RF\_evo] CR to TR 38.877 on correction and additional clarification on phase shifters for MB BS**

*Type: CR For: Agreement  
 38.877 v18.0.0 CR-0001 rev Cat: F (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

Huawei (Liehai) flags R4-2311663: we would like to clarify the types of phase shifter and also make a few updates.

**Decision: Revised to R4-2313967 (from R4-2311663).**

**R4-2313967 [FS\_NR\_BS\_RF\_evo] CR to TR 38.877 on correction and additional clarification on phase shifters for MB BS**

*Type: CR For: Agreement  
 38.877 v18.0.0 CR-0001 rev Cat: F (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

### 6.8 NB-IoT/eMTC core & perf. requirements for NTN

#### 6.8.1 SAN RF requirement and conformance testing

**R4-2312641 Discussion on Unwanted emission for IoT NTN**

*Type: other For: Approval  
 Source: China Telecomunication Corp*

**Decision: Noted.**

CR on Unwanted emission   
**R4-2312639 CR on Unwanted emission requirement for IoT NTN**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-0010 rev Cat: F (Rel-18)  
  
 Source: China Telecomunication Corp*

**Decision: Revised to R4-2313947 (from R4-2312639).**

**R4-2313947 CR on output power dynamic range for IoT NTN**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-0010 rev Cat: F (Rel-18)  
  
 Source: China Telecomunication Corp*

**Decision: Agreed.**

**R4-2312640 CR on Unwanted emission requirement for IoT NTN**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0005 rev Cat: F (Rel-18)  
  
 Source: China Telecomunication Corp*

**Decision: Revised to R4-2313948 (from R4-2312640).**

**R4-2313948 CR on Unwanted emission requirement for IoT NTN**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0005 rev Cat: F (Rel-18)  
  
 Source: China Telecomunication Corp, NEC*

**Decision: Postponed.**

**R4-2311704 CR to 36.108: Out-of-band emissions requirements**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-0007 rev Cat: F (Rel-18)  
  
 Source: NEC*

**Decision: Revised to R4-2313949 (from R4-2311704).**

**R4-2313949 CR to 36.108: Out-of-band emissions requirements**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-0007 rev Cat: F (Rel-18)  
  
 Source: NEC, China Telecomunication Corp*

**Decision: Postponed.**

**R4-2311705 CR to 36.181: Out-of-band emissions requirements**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0002 rev Cat: F (Rel-18)  
  
 Source: NEC*

**Decision: Merged (with R4-231xxxx).**

**R4-2311706 CR to 36.108: Characteristics of the interfering signals**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-0008 rev Cat: F (Rel-18)  
  
 Source: NEC*

Ericsson: Cloud you clarify the changes?

NEC: It’s aligned with NR NTN decision.

Ericsson: IoT NTN we refer to co-existence case 6. NR NTN waveform can be different compared to IoT NTN. Based on IoT NTN co-existence, we didn’t performance impact.

Keysight: In table C-2, PDSCH -> NPDSCH

**Decision: Not pursued.**

**R4-2311707 CR to 36.181: Characteristics of the interfering signals**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0003 rev Cat: F (Rel-18)  
  
 Source: NEC*

**Decision: Not pursued.**

**R4-2311708 CR to 36.181: Test model correction for total power dynamic range requirements**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0004 rev Cat: F (Rel-18)  
  
 Source: NEC*

*Ericsson: The removed sentence for manufacture declaration should be kept.*

**Decision: Revised to R4-2313950 (from R4-2311708).**

**R4-2313950 CR to 36.181: Test model correction for total power dynamic range requirements**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0004 rev Cat: F (Rel-18)  
  
 Source: NEC*

**Decision: Agreed.**

#### 6.8.5 Demodulation requirements

##### 6.8.5.1 UE demodulation

**R4-2311296 CR to 36.307: Release independent for IoT-NTN demodulation requirements**

*Type: CR For: Agreement  
 36.307 v17.5.0 CR-4492 rev Cat: F (Rel-17)  
  
 Source: MediaTek*

**Decision: Agreed.**

**R4-2311297 CR to 36.307: Release independent for IoT-NTN UE demodulation requirements (Rel-18)**

*Type: CR For: Agreement  
 36.307 v18.1.0 CR-4493 rev Cat: A (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Agreed.**

**R4-2311303 CR to TS36.102: Corrections to IoT-NTN requirements**

*Type: CR For: Agreement  
 36.102 v18.2.0 CR-0015 rev Cat: F (Rel-18)  
  
 Source: MediaTek, Qualcomm*

**Decision: Agreed.**

**R4-2311524 NTN NB-IoT/eMTC demodulation performance requirements**

*Type: discussion For: Agreement  
 Source: Qualcomm*

**Decision: Noted.**

##### 6.8.5.2 SAN demodulation

**R4-2312205 Discussion and simulation results for eMTC and NB-IoT over NTN**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312789 Simulation results of SAN demodulation requirements for IoT-NTN**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312791 Summary of SAN simulation results for IoT-NTN**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313662 [LTE\_NBIOT\_eMTC\_NTN\_req-Perf] Discussion on SAN demodulation requirements for LTE NTN IOT**

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

**Decision: Noted.**

**R4-2313663 [LTE\_NBIOT\_eMTC\_NTN\_req-Perf] Simulation results on SAN demodulation requirements for LTE NTN IOT**

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

**Decision: Noted.**

**R4-2312206 Draft CR on SAN demodulation requirements for NB-IoT over NTN**

*Type: draftCR For: Endorsement  
 36.108 v18.2.0 CR- rev Cat: F (Rel-18)  
  
 Source: Samsung*

**Decision: Not pursued.**

**R4-2313943 CR on SAN demodulation requirements for NB-IoT over NTN**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-? rev Cat: F (Rel-18)  
  
 Source: Samsung*

**Decision: Agreed.**

**R4-2312790 draft CR: Introduction of SAN demodulation requirements for IoT-NTN**

*Type: draftCR For: Endorsement  
 36.108 v18.2.0 CR- rev Cat: F (Rel-18)  
  
 Source: Ericsson*

**Decision: Not pursued.**

**R4-2313944 CR: Introduction of SAN demodulation requirements for IoT-NTN**

*Type: CR For: Agreement  
 36.108 v18.2.0 CR-? rev Cat: F (Rel-18)  
  
 Source: Ericsson*

**Decision: Agreed.**

**R4-2311070 [LTE\_NBIoT\_eMTC\_NTN\_req] CR on TS 36.181 for SAN Demodulation on PUSCH**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0001 rev Cat: F (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2313941 (from R4-2311070).**

**R4-2313941 [LTE\_NBIoT\_eMTC\_NTN\_req] CR on TS 36.181 for SAN Demodulation on PUSCH**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0001 rev Cat: F (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313664 [LTE\_NBIOT\_eMTC\_NTN\_req-Perf] CR on IOT NTN demodulation performance requirements (TS36.181, Rel-18)**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0006 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313942 (from R4-2313664).**

**R4-2313942 [LTE\_NBIOT\_eMTC\_NTN\_req-Perf] CR on IOT NTN demodulation performance requirements (TS36.181, Rel-18)**

*Type: CR For: Agreement  
 36.181 v18.0.0 CR-0006 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Agreed.**

### 6.9 Moderator summary and conclusions

**[108][316] IoT\_NTN\_SANRF, AI 6.8.1**

**R4-2314252 Topic summary for [108][316] IoT\_NTN\_SANRF**

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

**Decision: Noted.**

**Sub-topic 1-1: OOB requirement**

* Proposals (not mutually exclusive)
  + Proposal 1: It’s suggested to use BWNecessary instead of BWChannel in TS36.108 for Unwanted emission requirement of IoT NTN. FFS on whether corresponding update should be aligned between NR NTN and IoT NTN (R4-2312641, China Telecomunication Corp)
  + Proposal 2: The OBUE requirement should be extended to BWNecessary beyond DL operating band edge (R4-2312641, China Telecomunication Corp)
  + Proposal 3: The PSD terminology in OBUE requirement should be updated to align with ITU recommendation (R4-2312641, China Telecomunication Corp)
  + Proposal 4: RAN4 agreed to adopt out-of-band emissions instead of Operating band unwanted emissions for NR NTN solutions. Same approach shall be taken for NB-IoT/eMTC core & performance requirements for NTN, i.e. Introduce OOB emissions and remove OBUE; Introduce BWSAN and remove ΔfOBUE (R4-2311704/05; NEC)
* Discussion:
  + China Telecom: We have offline agreement to follow NR NTN approach to introduce out of band emission requirements.
  + Huawei: Proposal 4 should be fine. For P1 to P3, this issue seems not only IoT NTN specific; if this approach adopted then we need to have aligned approach among IoT NTN and NR NTN.
  + NEC: We have offline with Ericsson and CATT; we should have aligned specification between NR NTN and IoT NTN, this is common understanding.
  + Ericsson: To Huawei, we have specific difference between IoT NTN and NR NTN.
  + China Telecom: IoT NTN originally refer to NR NTN, after further checking we believe the issue already resolved. We should align both specifications considering update in this meeting for NR NTN.
* Agreement: P4 is agreed

**[108][318] IoT\_NTN Demod\_Maintenance, AI 6.8.5**

**R4-2314254 Topic summary for [108][318] IoT\_NTN Demod\_Maintenance**

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

**Decision: Noted.**

**Topic #1 UE Demodulation**

**Issue 1: SNR requirement for test2 of Cat-M1**

* Proposals
  + Option 1 (Qualcomm): Set the requirement for test2 of Cat-M1 as -4.2dB
* Agreement
  + Option 1 agreed

**Topic #2 BS Demodulation**

**Issue 1: Test applicability of 1Rx tests and 2Rx tests in TS 36.181**

* Proposals
  + Option 1 (Samsung, Huawei): Reuse Rel-17 NR NTN applicability rule for specifying the applicability rule of 1Rx test and 2Rx test for IoT over NTN SAN requirement
* Agreement
  + Option 1 agreed

**Issue 2: Measurement uncertainties and test tolerance**

* Proposals
  + Option 1 (Samsung):

|  |  |  |
| --- | --- | --- |
| **Subclause** | **Maximum Test System Uncertainty1** | **Derivation of Test System Uncertainty** |
| 8.1.1 Performance requirements of PUSCH in multipath fading propagation conditions transmission on single antenna port for coverage enhancement | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.2.1 ACK missed detection for PUCCH format 1a transmission on single antenna port for coverage enhancement | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.3.1 PRACH false alarm probability and missed detection | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.4.1 Performance requirements for NPUSCH format 1 | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.5.1 ACK missed detection for NPUSCH format 2 | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| 8.6.1 Performance requirements for NPRACH | ± 0.6 dB | Overall system uncertainty for fading conditions comprises two quantities:  1. Signal-to-noise ratio uncertainty  2. Fading profile power uncertainty  Items 1 and 2 are assumed to be uncorrelated so can be root sum squared:  Test System uncertainty = [SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2)]  Signal-to-noise ratio uncertainty ±0.3 dB  Fading profile power uncertainty ±0.5 dB |
| In addition, the following Test System uncertainties and related constraints apply:   |  |  | | --- | --- | | AWGN Bandwidth | = 1.08MHz;NRB x 180kHz according to BWConfig | | AWGN absolute power uncertainty, averaged over BWConfig | ±1.5 dB | | AWGN flatness and signal flatness, max deviation for any resource block, relative to average over BWConfig | ±2 dB | | AWGN flatness over BWChannel, max deviation for any resource block, relative to average over BWConfig | +2 dB | | AWGN flatness and signal flatness, max difference between adjacent resource blocks | ±0.5 dB | | AWGN peak to average ratio | ≥10 dB @0.001% | | Signal-to noise ratio uncertainty, averaged over uplink transmission Bandwidth | ±0.3 dB | | Fading profile power uncertainty | Test-specific | | Fading profile delay uncertainty, relative to frame timing | ±5 ns (excludes absolute errors related to baseband timing) | | | |
| Note 1: Only the overall stimulus error is considered here. The effect of errors in the throughput measurements due to finite test duration is not considered. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **Minimum Requirement in TS 38.108** | **Test Tolerance (TT)** | **Test Requirement in TS 38.181** |
| 8.2.1 Performance requirements of PUSCH in multipath fading propagation conditions transmission on single antenna port for coverage enhancement | SINRs as specified | 0.6dB | Formula: SINR + TT  T-put limit unchanged |
| 8.3.1 ACK missed detection for PUCCH format 1a transmission on single antenna port for coverage enhancement | SNRs as specified | 0.6 dB | Formula: SNR + TT  False ACK limit unchanged  Correct ACK limit unchanged |
| 8.4.1 PRACH false alarm probability and missed detection | SNRs as specified | 0.6dB | Formula: SNR + TT  PRACH False detection limit unchanged  PRACH detection limit unchanged |
| 8.5.1 Performance requirements for NPUSCH format 1 | SINRs as specified | 0.6dB | Formula: SINR + TT  T-put limit unchanged |
| 8.5.2 ACK missed detection for NPUSCH format 2 | SINRs as specified | 0.6dB | Formula: SNR + TT  False ACK limit unchanged  Correct ACK limit unchanged |
| 8.5.3 Performance requirements for NPRACH | SNRs as specified | 0.6dB | Formula: SNR + TT  NPRACH False detection limit unchanged  NPRACH detection limit unchanged |

* Agreement
  + Option 1 agreed

Session chair note: Companies can further provide simulation results to align the results and update requirements accordingly for NB-IoT/eMTC SAN demodulation requirements.

## 8 Rel-18 on-going non-spectrum related work items and study items for NR

### 8.2 Study on NR FR2 OTA testing enhancements

#### 8.2.1 General and work plan

**R4-2312890 3GPP TR 38.871 v0.4.0**

*Type: draft TR For: Agreement  
 38.871 v0.3.0 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm Incorporated*

**Decision:** Email approval

**R4-2312914 TP for assistant coordination system**

*Type: pCR For: Approval  
 38.871 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

**Decision: Revised to R4-2313887 (from R4-2312914).**

**R4-2313887 TP for assistant coordination system**

*Type: pCR For: Approval  
 38.871 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source:* OPPO, ROHDE & SCHWARZ, Qualcomm Incorporated

**Decision: Endorsed.**

#### 8.2.2 Test methods for RF requirements

**R4-2312889 TP to TR38.871 on UE RF testing methodology**

*Type: pCR For: Approval  
 38.871 v0.3.0 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm Incorporated*

**Decision: Endorsed.**

**R4-2312507 On measurement grid and other testing issues for 2AoA spherical coverage**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312579 Discussion on the impact of measurement grid in multi-Rx RF test**

*Type: other For: Approval  
 Source: vivo*

**Decision: Noted.**

**R4-2312886 Views on RF test method for FR2 multi-Rx UE**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2312915 Discussion of test procedure**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2313219 Discussion on Test methods for RF requirements**

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

**Decision: Noted.**

**R4-2313781 On Multi-RX UE RF topics**

*Type: other For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision: Noted.**

#### 8.2.3 Test methods for RRM requirements

**R4-2312888 Views on RRM test method for FR2 multi-Rx UE**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

#### 8.2.4 Test methods for Demodulation requirements

**R4-2312887 Views on demodulation test method for FR2 multi-Rx UE**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2313223 Discussion on Test methods for demod requirements**

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

**Decision: Noted.**

**R4-2313782 On Multi-RX UE demod topics**

*Type: other For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision: Noted.**

#### 8.2.5 Test uncertainty assessments

**R4-2312916 For measurement grid analysis**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

#### 8.2.6 Moderator summary and conclusions

**[108][329] FS\_NR\_FR2\_OTA\_enh, AI 5.2.5 (R4-2311231), 8.2**

**R4-2314265 Topic summary for [108][329] FS\_NR\_FR2\_OTA\_enh**

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

**Decision: Noted.**

**R4-2313884 Ad-hoc minutes for FS\_NR\_FR2\_OTA\_enh**

*Type: other For: Approval  
 Source: Qualcomm*

**Decision: Agreed.**

**Issue 2-1-1: Testability analysis for the RRM testing scenarios**

* Proposals
  + Option 1: Time and Frequency multiplexed downlink transmission should be supported by 2AoA measurement setup for multi-Rx RRM testing. The Illustration is shown in the below figure.



Figure 2.2.1-1: Illustration of downlink transmission for 2AoA measurement setup (R4-2312888)

* + Option 2: TBA
* Discussion
  + Anristu: Rel-18 multi-Rx WI has not studied this aspect yet, we would like to wait for the decision from WI.
  + QC: This is quite similar as legacy test set-up. According work plan on WI, RRM core requirements will be finalized by this meeting. We need to provide guidance from test ability aspect to RRM session for them start the work on introducing test cases.

**Issue 2-1-2: Test directions for 2AoA measurement setup**

* Proposals
  + Option 1 (Qualcomm): The spherical coverage requirements defined in the UE RF session should be taken as the baseline of test directions selection in multi-Rx RRM testing.
  + Option 2: TBA
* Discussion
  + R&S: The spherical coverage requirements in UE RF session still on discussion on the test metric. In general, we are fine to follow the decision from RF session to select test directions.
  + R&S: We need to further consider other aspects with limited test points.
  + QC: In legacy RRM test, we follow RF session requirement on test directions.
* Agreement:
  + [2 AOA Spherical coverage requirements] defined in the UE RF session should be taken as the baseline of test directions selection in multi-Rx RRM testing.

**Issue 2-1-3: Dual TCI switching**

* Proposals: Companies to provide the views for the following options for dual TCI switching test
  + Option 1 (Qualcomm): Dual TCI switches simultaneously, probe number for multiple AoA test system is at least 4



Figure 2.2.1-2: Illustration of Dual TCI switches simultaneously with 4 probes

* For option 1, in the period of T1, DUT connects TCI state 0 and TCI state 1 via probe#1 and probe#2 respectively. Then in the period of T2, TCI state 0 switches to TCI state 3 via switching between probe#1 and probe#4, and in the meanwhile, TCI state 1 switches to TCI state 2 via switching between probe#2 and probe#3.
  + Option 2: Dual TCI switches sequentially, probe number for multiple AoA test system is at least



Figure 2.2.1-3: Illustration of Dual TCI switches simultaneously with 3 probes

* For option 2, in the period of T1, DUT connects TCI state 0 via probe#1. In the period of T2, TCI state 0 (anchor TCI) firstly switches to TCI state 2 via switching between probe#1 and probe#3. Then the TCI state 1 is added via probe#2.
  + Option 3: Dual TCI switches simultaneously, but the beam directions are not changed, probe number for multiple AoA test system is at least 2

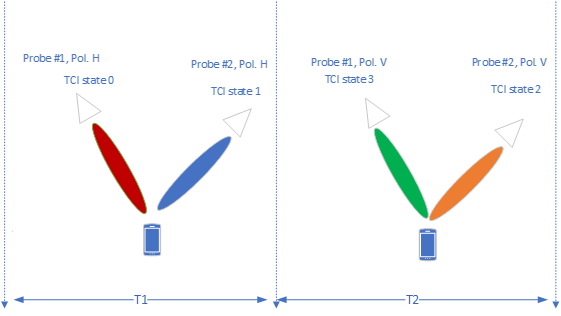


Figure 2.2.1-4: Illustration of Dual TCI switches simultaneously with 2 probes

* For option 3, in the period of T1, DUT connects TCI state 0 and TCI state 1 via Pol.H of probe#1 and Pol.H of probe#2, respectively. Then in the period of T2, TCI state 0 switches to TCI state 3 via switching between Pol.H and Pol.V of probe 1, and in the meanwhile, TCI state 1 switches to TCI state 2 via switching between Pol.H and Pol.V of probe 2. Note that in option 3, different SSB IDs are transmitted from two polarizations in T1 and T2.
  + Option 4: TBA
* Discussion
  + R&S: Thanks for the effort from QC on the summary. Obviously, option 3 is simplest way meanwhile with option 1, 2 we may loss available test points. Pending on the demand and test cases, option 1 maybe still feasible for some of test cases. We suggest to keep all these options into TR and further check based on test cases.
  + Anristru: We share the view from R&S. In our understanding, side condition on RRM core requirements still on discussion and pending on the request from RRM core requirements aspect, whether simultaneously TCI state switching required or not.
  + Keysight: We share similar view as R&S and Anristru. We can consider option 2 and option 3.
  + QC: We can understand the complexity difference among these options. We support the proposal from R&S to keep all these options into TR and further check pending on the decision from RRM session on requirements introduction.
* Agreement:
  + Take all three candidate options into Test TR with listing pros and cons and further discuss based on the conclusion from RRM session for introduced RRM requirements.

**Issue 2-2-1: SINR control for rough beam**

* Proposals
  + Option 1 (Qualcomm): For rough beam, the lower bound of G1/G2 is the gain difference from legacy REFSENS and legacy EIS spherical coverage
  + Option 2: TBA
* Agreement:
  + Option 1 agreed

**Issue 3-1-1: X value in Noc level configuration**

* Proposals
  + Option 1 (Qualcomm): As a baseline, RAN4 to use X = 2 for multi-Rx demodulation test directions selection
  + Option 2: (Huawei): Clarify the simulation assumptions before specifying X
* Discussion:
  + Samsung: What’s the simulation output? Here we directly reuse simulation assumption from RF session. Besides RF special coverage requirements from RF session, do we need separate test to find test direction for demodulation test cases?
  + QC: We can reuse the simulator as RF simulation meanwhile the metric to be checked different compared to RF session as feasible pair. We already have agreements in previous meeting. Firstly we find test direction, then TE to control Noc level to set-up suitable SNR.
* Agreement:
  + Further align the simulation assumption, and make decision in RAM4#108bis for X value with in the range [2~5].

**Issue 3-2-1: Assumptions for minimum isolation simulation and corresponding MU**

* Proposals
  + Option 1 (Qualcomm): The following assumptions are adopted for simulation of minimum isolation requirements.
    - For the reference SNR, the following assumptions could be considered:
      * Assume α = 0, β = 0, and γ = good enough isolation, e.g., 100dB
      * Channel model parameters
      * TDLA30-75 is assumed for 100 MHz/120 kHz
      * Time offset values: {0.25us, -0.0625us}/0; Frequency offset: 600Hz/0
      * MCS: MCS13 with 2+2
      * Receiver assumptions: Separate processing per Rx chain.
    - For comparison, to run the simulation with the isolation range of [8dB, 20dB] including both cross-polarizations and cross-talk and then compare the offset between reference SNR and required SNR with different isolation values.
  + Option 2: TBA
* Discussion
  + Keysight: We prefer to keep the time offset and frequency offset values with 0 as ideal case to simplify the simulation.
* Agreement:
  + The following assumptions are adopted for simulation of minimum isolation requirements.
    - For the reference SNR, the following assumptions could be considered:
      * Assume α = 0, β = 0, and γ = good enough isolation, e.g., 100dB
      * Channel model parameters
      * TDLA30-75 is assumed for 100 MHz/120 kHz
      * Time offset values: 0; Frequency offset: 0
      * MCS: MCS13 with 2+2
      * Receiver assumptions: Separate processing per Rx chain.
    - For comparison, to run the simulation with the isolation range of [8dB, 20dB] including both cross-polarizations and cross-talk and then compare the offset between reference SNR and required SNR with different isolation values.

**Issue 4-1-1: Measurement Grids for Optional 6x2 PC3**

* Proposals
  + Option 1 (Apple): RAN4 to introduce measurement Grids for Optional 6x2 PC3 Antenna Array Configuration
  + Option 2: TBA
* Discussion
  + Apple: We received the feedback from offline to leave this work to RAN5. We can consider to send a LS to RAN5 and from our perspective, it’s a very useful work we need to consider.
  + Keysight: We believe nothing can be done in RAN4, it belongs to RAN5 responsibility. We can send a LS to RAN5 to inform RAN4 recommendation.
  + Samsung: We doubt the necessity to add another alternative which never agreed for 4x2. Handhold UE can declare based on the assumption 4x2. We believe a new WI/SI more proper to address this issue with more study/simulation effort.
  + Apple: This comes from the demand of OEM in the market, this approach already adopted in TTIA.
  + Keysight: Add another alternative was to address the demand from OEM, and still pending on vendor declaration.
  + Apple: Measurement optimization is within the objectives from this SI. We follow the same procedure as previously did.
  + QC: Add other alternatives just allow more flexibility for vendors. We are ok to send LS to RAN5.
  + Samsung: This SI already concluded for several years. We suggest to consider this in RAN5 without LS from RAN4.

**R4-2313888 WF for FR2 test SI**

*Type: other For: Approval  
 Source: Qualcomm*

**Discussion:**

OPPO: For issue 1-3, we are ok to keep the content as it is in this meeting, and further update to align with RF core requirement agreements in next meeting.

**Decision: Approved.**

**R4-2313889 LS to RAN5 for measurement grid based on the assumption of 6x2 for PC3**

*Type: LSout For: Approval*

*To RAN5  
 Source: Apple*

**Discussion:**

**Decision: Withdrawn.**

### 8.4 Further RF requirements enhancement for NR and EN-DC in FR1

#### 8.4.3 Demodulation and CSI requirements

##### 8.4.3.1 8Rx UE demodulation and CSI

###### 8.4.3.1.1 General

Draft CRs

**R4-2312352 Draft CR on 8Rx PDSCH demodulation requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Samsung*

**Decision: Revised to R4-2313878 (from R4-2312352).**

**R4-2313878 Draft CR on 8Rx PDSCH demodulation requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Samsung*

**Decision: Endorsed.**

**R4-2311078 draftCR for 38.101 - inclusion of 8Rx Applicabilty Rule**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2313879 (from R4-2311078).**

**R4-2313879 draftCR for 38.101 - inclusion of 8Rx Applicabilty Rule**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2311525 8Rx for CPE/FWA/vehicle/industrial devices: Demodulation requirements**

*Type: discussion For: Agreement  
 Source: Qualcomm*

**Decision: Noted.**

**R4-2311526 Views on 8Rx demodulation performance requirements: Simulation results**

*Type: discussion For: Agreement  
 Source: Qualcomm*

**Decision: Noted.**

**R4-2311071 General Discussion on 8Rx**

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

**Decision: Noted.**

**R4-2311904 Further Discussion on General Aspects of 8Rx Requirements in FR1**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2312350 discussion on 8Rx general requirements**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2313307 Remaining issues on general aspects for 8 Rx in FR1**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

###### 8.4.3.1.2 PDSCH requirements

Draft CRs

**R4-2311509 Draft CR to TS 38.101-4 for supporting of 8Rx in Rel-18**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: ZTE Corporation*

**Decision: Endorsed.**

**R4-2311909 draft CR on Inclusion of Correlation Matrices for 8Rx UEs**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2312616 Draft CR to 38.101-4 Reference measurement channels for 8Rx PDSCH requirements**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Endorsed.**

Simulation results summary

**R4-2313310 Simulation results collection for 8 Rx UE demodulation requirements**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2311072 Discussion on PDSCH Demodulation Requirements for 8Rx**

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

**Decision: Noted.**

**R4-2311073 Supporting Simulation results for PDSCH demod for 8Rx**

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

**Decision: Noted.**

**R4-2311089 Discussion on PDSCH resuirements for UE with multiple Rx**

*Type: discussion For: Discussion  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311090 Discussion on PDSCH resuirements for UE with multiple Rx: Simulation results**

*Type: discussion For: Information  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311424 Views on 8Rx UE demodulation requirements for CA**

*Type: discussion For: Discussion  
 Source: NTT DOCOMO, INC.*

**Decision: Noted.**

**R4-2311507 Discussion on 8Rx Demodulation Requirements**

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

**Decision: Noted.**

**R4-2311508 Simulation results for PDSCH demodulation requirements for 8Rx**

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

**Decision: Noted.**

**R4-2311905 On the PDSCH Demodulation Requirements for 8Rx UEs in FR1 in TDD, FDD and CA Modes**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2311906 Collection of Simulation Results for PDSCH Demodulation Requirements for 8Rx UEs in FR1**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2312351 discussion and simulation results on 8Rx PDSCH requirements**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312614 Discussion on PDSCH requirements for 8Rx UE**

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

**Decision: Noted.**

**R4-2313271 Discussions on PDSCH requirements for 8Rx**

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

**Decision: Noted.**

**R4-2313308 Remaining issues on PDSCH requirements for 8 Rx in FR1**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313309 Simulation results for 8 Rx PDSCH requirements in FR1**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

###### 8.4.3.1.3 SDR requirements

Darft CR

**R4-2313306 draft CR on SDR requirements for 8 Rx in FR1**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Endorsed.**

**R4-2313924 draft CR on SDR requirements for 8 Rx in FR1**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Withdrawn.**

**R4-2311074 Discussion on SDR Demodulation Requirements for 8Rx**

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

**Decision: Noted.**

**R4-2311075 Supporting Simulation results for SDR demod for 8Rx**

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

**Decision: Noted.**

**R4-2311908 Final Discussion on SDR Requirements for 8Rx in TDD, FDD and CA**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2313311 Remaining issues on SDR requirements for 8 Rx in FR1**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313312 Simulation results for 8 Rx SDR in FR1**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

###### 8.4.3.1.4 CQI reporting requirements

Draft CR

**R4-2311093 Draft CR on CQI requirements for UE with multiple Rx**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: China Telecom*

**Decision: Revised to R4-2313880 (from R4-2311093).**

**R4-2313880 Draft CR on CQI requirements for UE with multiple Rx**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: China Telecom*

**Decision: Endorsed.**

**R4-2313273 draft CR on 38.101-4 Requirements applicability for 8Rx CSI applicabaility rules**

*Type: draftCR For: Endorsement  
 38.101-4 v18.0.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei,HiSilicon*

**Decision: Endorsed.**

**R4-2311076 Discussion on CQI Demodulation Requirements for 8Rx**

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

**Decision: Noted.**

**R4-2311077 Supporting Simulation results for CQI demodulation for 8Rx**

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

**Decision: Noted.**

**R4-2311091 Discussion on CSI resuirements for UE with multiple Rx**

*Type: discussion For: Discussion  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311092 Discussion on CSI resuirements for UE with multiple Rx: Simulation results**

*Type: discussion For: Information  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311907 Final Discussion on CQI Requirements**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2312613 Discussion on CQI requirements for 8Rx UE**

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

**Decision: Noted.**

**R4-2313272 Discussions on 8Rx CQI requirements**

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

**Decision: Noted.**

**R4-2313313 Remaining issues on CQI reporting for 8Rx in FR1**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313314 Simulation results for CQI reporting for 8Rx in FR1**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

##### 8.4.3.2 4Tx BS demodulation

Draft CR

**R4-2312213 Draft CR on applicability rule for PUSCH UL 4Tx requirement in TS 38.141-1**

*Type: draftCR For: Endorsement  
 38.141-1 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Samsung*

Ericsson: Cover page error for specification number.

**Decision: Revised to R4-2313881 (from R4-2312213).**

**R4-2313881 Draft CR on applicability rule for PUSCH UL 4Tx requirement in TS 38.141-1**

*Type: draftCR For: Endorsement  
 38.141-1 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Samsung, Cybercore*

**Decision: Endorsed.**

**R4-2311081 draftCR for 38.104 - inclusion of 4Tx Requirements**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

Samsung: SNR values need to be updated based on latest collected results.

**Decision: Revised to R4-2313882 (from R4-2311081).**

**R4-2313882 draftCR for 38.104 - inclusion of 4Tx Requirements**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2312067 Draft CR for TS38.104 4Tx PUSCH FRC table**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Endorsed.**

**R4-2312068 Draft CR for TS38.141-2 4Tx PUSCH FRC table**

*Type: draftCR For: Endorsement  
 38.141-2 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Endorsed.**

**R4-2311079 Discussion of 4Tx Demodulation Requirements**

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

**Decision: Noted.**

**R4-2311080 Supporting simulations for 4Tx Demodulation**

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

**Decision: Noted.**

**R4-2311506 Simulation results for 4Tx of NR\_ENDC\_RF\_FR1\_enh2**

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

**Decision: Noted.**

**R4-2312066 Simulation results summary for 4Tx demodulation results**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312212 Simulation results for PUSCH with UL 4-layer transmission**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

#### 8.4.4 Moderator summary and conclusions

**[108][319] RF\_FR1\_enh2\_Demod\_Part1, AI 8.4.3.1**

**R4-2314255 Topic summary for [108][319] RF\_FR1\_enh2\_Demod\_Part1**

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

**Decision: Noted.**

**R4-2313873 Ad-hoc minutes for FR1 RF demodulation**

*Type: other For: Approval  
 Source: Huawei*

**Decision: Approved.**

**Issue 2-1-1: MCS for Rank2 test**

* Proposals
  + Option 1: MCS19 for Table 1 (Nokia, Qualcomm, Huawei, Samsung, MTK, Apple, China Telecom)
  + Option 2: MCS20 for Table 2 (China Telecom, Apple, Samsung)
    - Revert to MCS19 for Table 1 if any feasibility/alignment issues are observed to avoid further delays (Apple)
  + Option 3: Both MCS13 (Table 2) and MCS20 (Table 2) (Ericsson)
* Discussion:
  + Ericsson: We proposed to choose maximum feasible MCS per modulation order. From our results, we believe MCS 20 is achievable which around 22.7 dB for impairment results with good span among the results from companies.
  + Nokia: We need to take the impact to Tx EVM into consideration when deciding feasible MCS. With this, we prefer MCS 19.
  + Ericsson: We want to see more analysis on Tx EVM impact.
  + Nokia: We think 20.1 dB can be considered as upper bound of test able SNR considering Tx EVM impact.
  + QC: Based on our evaluation results, MCS 20 can’t reach peak throughput.
  + MTK: For demodulation requirements, either MCS 20 and 19 can serve test purpose. Taking test limitation into account, MCS 19 can be more safe option.
* Agreement:
  + Option 1: MCS19 for Table 1

**Issue 2-2-1: PDSCH FDD requirements**

* Proposals
  + Option 1: RAN4 to define PDSCH FDD requirements with same parameters including MCS values, MIMO layers, antenna configuration, propagation conditions as TDD requirements. (Nokia, Huawei, Apple, Samsung, Ericsson)
* Agreement
  + Option 1.

**Sub-topic 3-1 FDD requirement**

**Issue 3-1-1: SDR requirements for FDD**

* Proposals
  + Option 1: Reuse the test setup of TDD requirements (Nokia, Ericsson)
* Agreement:
  + Reuse the TDD MCS look-up table for FDD SDR requirements

**Sub-topic 4-1: TDD requirements**

**Issue 4-1-1: Report quantity**

* Proposals
  + Option 1(Huawei)
    - Replace “00000001” by ”00010001” for *codebookSubsetRestriction*.
    - Replace “N/A” by ”00001000” for RI Restriction.
    - TE schedules fixed PMI matrix with =0 when verifying BLER requirements.
* Discussion:
  + QC: It’s not clear us for this proposal.
  + Ericsson: Why we need to change the configuration on “*codebookSubsetRestriction*.”.
  + MTK: Please clarify any technical issue for previous agreed configuration.
  + Huawei: For Rank 4 test, we think previous agreed RAN4 configuration not aligned with RAN1 core specification.

**Issue 4-1-2: SNR points**

* Proposals
  + Option 1: [1,2] dB and [7,8] dB (Nokia, Apple, Ericsson)
  + Option 2: [4,5]dB and [10,11]dB (China Telecom, Qualcomm, Apple, MTK, Huawei)
* Agreement:
  + Option 2 agreed

**Sub-topic 4-2: FDD requirements**

**Issue 4-2-1: Test parameter**

* Proposals
  + Option 1: (Ericsson)
    - 10 MHz/15 kHz, 52 RBs.
    - CQI index for up to 64QAM.
    - Rank 4.
* Agreement
  + Option 1

**Issue 4-2-2: Report quantity**

* Proposals
  + Option 1: (Ericsson)
    - Legacy configuration report quantity 'cri-RI-PMI-CQI '
    - *two-one-TypeI-SinglePanel-Restriction* = 00000001
    - TE sets i2 = 0 during the test
  + Option 2: (Huawei)
    - Replace “00000001” by ”00010001” for *codebookSubsetRestriction*.
    - Replace “N/A” by ”00001000” for RI Restriction.
    - TE schedules fixed PMI matrix with =0 when verifying BLER requirements.
* Agreement:
  + Align with the configuration from TDD case.

**Issue 4-2-3: SNR points**

* Proposals
  + Option 1: [1,2] dB and [7,8] dB (Nokia, Apple, Ericsson)
  + Option 2: [4,5]dB and [10,11]dB (China Telecom, Apple, MTK, Huawei)
* Agreement:
  + Option 2 agreed

**R4-2313877 WF for [108][319] RF\_FR1\_enh2\_Demod\_Part1**

*Type: other For: Approval  
 Source: Huawei*

**Discussion:**

**Decision: Approved.**

**[108][320] RF\_FR1\_enh2\_Demod\_Part2, AI 8.4.3.2**

**R4-2314256 Topic summary for [108][320] RF\_FR1\_enh2\_Demod\_Part2**

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

**Decision: Revised to R4-2313846 (from R4-2314256).**

**R4-2313846 Topic summary for [108][320] RF\_FR1\_enh2\_Demod\_Part2**

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

**Decision: Noted.**

* Proposal 1

RAN4 to follow the usual requirements derivation and outlier removal approach from Rel-15.

* Proposal 2

RAN4 shall define the new requirements tables for 50 MHz in TS 38.104 as 8.2.1-19 and 8.2.1-20 respectively, i.e., add a new table at the end of the current set of tables.

### 8.6 NR RF requirements enhancement for FR2, Phase 3

#### 8.6.4 BS demodulation requirements

##### 8.6.4.1 UL 256QAM performance requirements

**R4-2311082 Discussion on UL 256 QAM BS Demodulation**

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

**Decision: Noted.**

**R4-2311083 Supporting simulations for UL 256 QAM BS Demodulation**

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

**Decision: Noted.**

**R4-2311159 Discussion on PUSCH demodulation requirements for FR2 UL256QAM**

*Type: discussion For: Discussion  
 Source: NTT DOCOMO, INC.*

**Decision: Noted.**

**R4-2311831 Discussion on demodulation for FR2-1 UL 256QAM**

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

**Decision: Noted.**

**R4-2312069 Discussion on FR2 UL 256QAM demodulation requirements**

*Type: other For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312218 View on BS demodulation requirements for FR2 256QAM**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312687 Discussion on BS PUSCH demodulation performance for 256QAM**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2313665 Discussion on FR2 UL 256QAM performance requirements**

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

**Decision: Noted.**

#### 8.6.5 Moderator summary and conclusions

**[108][321] NR\_RF\_FR2\_req\_Ph3\_Demod, AI 8.6.4**

**R4-2314257 Topic summary for [108][321] NR\_RF\_FR2\_req\_Ph3\_Demod**

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

**Decision: Noted.**

**R4-2313921 WF for NR\_RF\_FR2\_req\_Ph3\_Demod**

*Type: other For: Approval  
 Source: Nokia*

**Decision: Revised to R4-2313946 (from R4-2313921).**

**R4-2313946 WF for NR\_RF\_FR2\_req\_Ph3\_Demod**

*Type: other For: Approval  
 Source: Nokia*

**Decision: Approved.**

### 8.7 Requirement for NR FR2 multi-Rx chain DL reception

#### 8.7.4 Demodulation performance and CSI requirements

##### 8.7.4.1 General aspects

**R4-2311349 On General aspects for Multi-RX in FR2 requirements**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2311743 On MultiRx Demodulation performance and CSI requirements - General aspects**

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

**Decision: Noted.**

**R4-2311756 Views on General Aspects for FR2 Multi-Rx**

*Type: discussion For: Discussion  
 Source: Qualcomm India Pvt Ltd*

**Decision: Noted.**

**R4-2311992 Discussion on general aspects of FR2 multiRX DL**

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

**Decision: Noted.**

**R4-2313315 General aspects for FR2 multi-Rx DL chain**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313651 Discussion on general issues for UE demodulation requirements for FR2 multi-Rx chain DL reception**

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

**Decision: Noted.**

##### 8.7.4.2 PDSCH requirements

**R4-2311350 Performance Evaluation of PDSCH with multi-RX in FR2**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2311744 On MultiRx Demodulation performance and CSI requirements - PDSCH**

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

**Decision: Noted.**

**R4-2311745 On MultiRx Demodulation performance and CSI requirements - simulation results**

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

**Decision: Noted.**

**R4-2311757 Views on PDSCH Performance Requirements for FR2 Multi-Rx**

*Type: discussion For: Discussion  
 Source: Qualcomm India Pvt Ltd*

**Decision: Noted.**

**R4-2311758 Simulation Results on PDSCH Performance Requirements for FR2 Multi-Rx**

*Type: discussion For: Discussion  
 Source: Qualcomm India Pvt Ltd*

**Decision: Noted.**

**R4-2311993 Discussion on PDSCH requirements of FR2 multiRX DL**

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

**Decision: Noted.**

**R4-2311994 Simulation results of PDSCH requirements of FR2 multiRX DL**

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

**Decision: Noted.**

**R4-2312353 discussion on FR2 Multi-Rx PDSCH demodulation requirements**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2313316 PDSCH demodulation requirements for FR2 multi-Rx chain**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313317 Simulation results for PDSCH of FR2 Multi-Rx UE**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313652 Discussion on UE PDSCH demodulation requirements for NR FR2 multi-Rx chain DL reception**

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

**Decision: Noted.**

##### 8.7.4.3 PMI reporting requirements

**R4-2311351 On PDSCH PMI reporting requirements with multi-RX in FR2**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2311746 On MultiRx Demodulation performance and CSI requirements - PMI**

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

**Decision: Noted.**

**R4-2311995 Discussion on PMI requirements of FR2 multiRX DL**

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

**Decision: Noted.**

**R4-2313318 PMI reporting for FR2 multi-Rx DL reception**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313653 Discussion on UE CSI reporting requirements for NR FR2 multi-Rx chain DL reception**

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

**Decision: Noted.**

#### 8.7.5 Moderator summary and conclusions

**[108][322] NR\_FR2\_multiRX\_DL\_Demod, AI 8.7.4**

**R4-2314258 Topic summary for [108][322] NR\_FR2\_multiRX\_DL\_Demod**

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

**Decision: Noted.**

**Issue 1-1-1: Receiver assumption.**

* Proposals:
* Option 1 (Nokia):
  + - * For sDCI SDM and mDCI fully overlapping, introduce requirements with joint processing receiver.
* Option 2 (Apple):
  + - * Introduce UE capability for joint processing with multi-RX
* Option 3 (Huawei):
  + Only consider UE perform independent processing with 2x2 channel matrix per TRP for FR2 multi-Rx demodulation requirements definition.
* Option 4 (Ericsson, MediaTek, Qualcomm):
  + Option 4a (Qualcomm): Further discuss receiver options in conjunction with cross-talk power level and PTRS rate-matching assumptions
  + Option 4b (Ericsson): Further discuss with companies on the pros and cons of each UE receiver schemes are needed.
  + Option 4c (MediaTek): Keep receiver options open until we have enough aligned simulation results of both receiver options
* Discussion:
  + Apple: We have agreed to evaluate both options with joint processing and separate processing. For 2+2 overlapping case, the performance degraded with separate processing which means joint processing required. We suggest to introduce UE capability with joint processing for this case.
  + Huawei: In our simulation results, we observe low MCS still workable with separate processing for 2+2 and 1+1 case.
  + Samsung: We see the pros and cons for both options and suggest to keep it open for further evaluation. We see the benefits with joint processing for 2+2 with high MCS and we think UE capability can be considered.
  + Ericsson: We agree the comments with Apple. For 2+2, we agreed with full overlapping case.
  + Nokia: We agree the needs on joint processing based on the simulation results. We can consider different use cases with separate assumption. We are also fine to consider UE capability introduction.
  + QC: For this release, we can consider separate processing as starting point. Once we support PDSCH rate matching on PTRS, then we can consider to introduce joint processing.
  + MTK: We suggest to keep it open for further evaluation and alignment between companies. We are ok to consider UE capability.
  + Ericsson: We need to ensure the proper performance, more results required. We are fine to introduce UE capability.
  + Apple: In Rel-16, we have introduced test cases for FR1. For Rel-18, we can focus on 2+2 mDCI without fully overlapping.
* Agreement:
  + Further evaluate the performance for 2+2 with fully overlapping case with joint processing and sperate processing
    - Pending on the performance comparison between different receiver assumption, RAN4 plan to decide in 2023 Q4 for this case including receiver assumption.
    - If test case with joint processing assumption introduced, UE capability with optional

**Issue 1-1-4: Choice of α and β values.**

* Proposals
  + Option 1 (Huawei): Select α=β=0 in the correlation matrix for all cases.
* Option 2 (Ericsson): RAN4 defines the UE demodulation and CSI reporting requirements for FR2 DL multi-RX chain using the correlation matrices parameters as follow:
* XP Low: α = 0, β = 0, γ = 0.125
* XP Medium: α = 0.3, β = 0.6, γ = 0.125
* XP High: α = 0.9, β = 0.9, γ = 0.125
* Discussion:
  + Nokia: We already have agreements as option 1.
* Agreement: Option 1

**Issue 1-1-9: Cross-polarization coefficient.**

* Observations
  + Observation 1 (Qualcomm): Cross-polarization coefficient of 0.125 corresponds to 9dB.
* Proposals
  + Option 1 (Qualcomm): Consider cross-polarization coefficient of 0.0625 to reflect an isolation level of 12 dB
* Agreement:
  + Option 1 agreed

**Issue 2-1-2: PTRS Port for sDCI schemes**

* Proposals
  + Option 1 (Qualcomm, Nokia, Apple, Samsung): One PTRS port per TRP for sDCI schemes
    - * Option 1a (Nokia): RAN4 to additionally define requirements using one PT-RS port for sDCI SDM, if found to be feasible
  + Option 2 (Huawei, Ericsson, MediaTek): One PTRS port across TRPs.
  + Option 3 (Apple): Evaluate if 1 PTRS port for sDCI SDM test is sufficient for the agreed test configuration
* Discussion:
  + Apple: For sDCI schemes, supporting two PTRS ports is optional feature. Our concern is the performance impact with one PTRS port. We suggest to evaluate the performance impact with one PTRS port assumption.
  + Nokia: We agree the comment from Apple. 2 PTRS port is optional feature. We can consider to introduce requirements for both cases if feasible and further evaluate the performance impact for 1 PTRS port.
  + Huawei: We should specify minimum performance requirements with single PTRS port, we can further evaluate the suitable parameter.
  + QC: We can consider test applicable rules with one PTRS port per port.
  + Samsung: We have similar view as QC and Apple.
* Agreement:
  + Further evaluate both cases: one PTRS port across TRPs and one PTRS port for each TRP
    - Companies are encouraged to evaluate the performance impact and decide suitable parameters for each case
    - Test applicable rules can be considered based on UE capability

**Issue 2-1-3: PDSCH rate matching in mDCI transmission**

* Proposals
* Option 1 (Nokia, Samsung, Qualcomm): PT-RS allocation does not overlap with PDSCH allocation per TRP as a baseline.
  + Option 1aa (Nokia): The baseline assumption can be re-evaluated if decided to ask RAN1 for clarification and RAN1 response does not match the baseline assumption.
* Option 2 (Samsung): PT-RS allocation does not overlap with PDSCH allocation per TRP.
* Option 3 (Ericsson): PT-RS allocation does not overlap with any PDSCH allocation.
* Option 4 (Apple): Evaluate performance with PTRS PDSCH overlap
* Option 5 (Apple): Introduce rate matching for PTRS from other TRP using ZP CSI-RS configuration
* Discussion:
  + Ericsson: With internal checking with RAN1, both options seem fine. We prefer option 3, but we can compromise to another option and no LS to RAN1 required.
  + Apple: Based on our internal checking, PDSCH rate-matching only can be applied for per TRP case, no cross TRP rate matching.
  + Samsung: We share similar view as Apple. In Rel-16, no PDSCH pattern across TRPs.
  + QC/Huawei: We share similar view as Samsung.
* Agreement: Following the features introduced by RAN1 in Rel-16, PDSCH rate matching in mDCI transmission
  + PDSCH shall rate matching around PTRS from same TRP only. And no LS needed.

**R4-2313848 Ad-hoc minutes for Multi-RX in FR2 requirements**

*Type: other For: Approval  
 Source: Qualcomm*

**Discussion:**

**Issue 2-1-6: PDSCH Configurations for demodulation requirements**

* Proposals
* Option 1 (Apple): Define PDSCH demodulation requirements with multi-RX for the following configurations.
  + - Multi-DCI with Overlapping PDSCH, 1 layer per TRP, Separate processing
    - Multi-DCI with Overlapping PDSCH, 2 layers per TRP, Joint processing
    - Single-DCI SDM with 1+1, Separate processing
    - Single-DCI SDM with 2+2, Joint processing
* Option 2 (Ericsson): Define PDSCH demodulation requirements with multi-RX for the following configurations.
  + - Multi-DCI with Overlapping PDSCH, 2 layers per TRP, Joint processing
    - Multi-DCI with non-overlapping PDSCH, 2 layers per TRP, Separate processing
    - Single-DCI SDM with 1+1 and 2+2, Separate processing

Agreement: Further evaluate following cases:

* + Multi-DCI with Overlapping PDSCH, 1 layer per TRP,
  + Multi-DCI with Overlapping PDSCH, 2 layers per TRP
  + Multi-DCI with non-overlapping PDSCH, 2 layers per TRP
  + Single-DCI SDM with Overlapping PDSCH, 1 layer per TRP,
  + Single-DCI SDM with Overlapping PDSCH, 2 layers per TRP

Apple: In Rel-18 multi-Rx WI, we have a RAN4 TR to capture RF analysis, do we need to do similar thing for demodulation analysis?

QC: Our understanding that TR dedicated for RF.

**Decision: Approved.**

**R4-2313977 WF for Rel-18 Multi-Rx performance requirements**

*Type: other For: Approval  
 Source: Qualcomm*

**Discussion:**

**Decision: Approved.**

### 8.11 Support of intra-band non-collocated EN-DC/NR-CA deployment

#### 8.11.4 Demodulation performance requirements

**R4-2311833 Discussion on demodulation requirement for intra-band non-collocated NR-CA**

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

**Decision: Noted.**

**R4-2311910 Testing Criteria for Type-2 UEs in Intra-band Non-collocated Non-contiguous NR CA**

*Type: discussion For: Discussion  
 38.101-4 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2311996 Discussion on Intra-Band Non-Collocated NR-CA**

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

**Decision: Noted.**

**R4-2311997 Simulation results of Intra-Band Non-Collocated NR-CA**

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

**Decision: Noted.**

**R4-2312499 Non-collocated Intraband UE Demod**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

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

**R4-2312788 UE demodulation requirements for non-colocated NR-CA deployment scenario**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313068 Discussion on UE Demodulation for non-collocated FR1 intra-band EN-DC/NR-CA**

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

**Decision: Noted.**

**R4-2313279 Discussion on CA requirements with 25dB imbalance power difference**

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

**Decision: Noted.**

#### 8.11.5 Moderator summary and conclusions

**[108][323] NonCol\_intraB\_ENDC\_NR\_CA\_Demod, AI 8.11.4**

**R4-2314259 Topic summary for [108][323] NonCol\_intraB\_ENDC\_NR\_CA\_Demod**

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

**Decision: Noted.**

**Issue 1-1-1: Test setup and parameters**

* Proposals
  + Option 1 (ZTE, Nokia): Reuse the existing PDSCH CA power imbalance test requirements (e.g., TS 38.101-4 5.2A.2.2)
  + Option 2 (Ericsson): Reuse the existing PDSCH CA demodulation requirements (e.g., TS 38.101-4 5.2A.2.1)
* Discussion:
* Huawei: We support option 2. We have timing difference and power difference among PCC and SCC, we need to ensure the performance with CA under such side condition. Original power imbalance test was to verify UE performance on interference rejection.
* Apple: Original power imbalance test assuming shared RF chain between two 2CCs. But for this new case, the assumption we have separate RF chain per CC. SDR test vs regular CA demod test case, we prefer to follow regular CA demod with proper test set-up.
* Nokia: We proposed option 1. This is not normal CA demodulation test cases, considering power imbalance and timing offset. We believe option 1 easier to implement power imbalance and timing offset. Meanwhile we think probably both options can be workable.
* MTK: We have similar view as Huawei and Apple.
* QC: We support option 2 to follow CA demod approach.
* Agreement: Option 2 agreed

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Power imbalance tests (e.g., TS38.101-4, 5.2A.2.2)** | **CA demodulation tests (e.g., TS38.101-4 5.2A.2.1)** | **Type 2 UE NR-CA demodulation requirements (new)** |
| Received power difference | 6 dB | 0 dB (No difference) | 25 dB |
| Received time difference | 0 µs (No difference) | 0 µs (No difference) | 33 µs |
| Channel model | Static propagation condition with no external noise sources applied | Fading (e.g., TDLA30-10) | [AWGN] |
| Maximum number of HARQ transmission | 1 | 4 | [1] |
| **Issue 1-1-2:** Signal/Noise setting | Noiseless (Set Es only) | Set both Es and Noc to set SNR test points | Set both Es and Noc to set SNR test points |
| **Issue 1-1-3:** Throughput measurement procedure | Measure one carrier only | Measure both carriers at the same time | Measure both carriers |
| **Issue 1-1-4:** Tx antenna configuration and rank | 1Tx, Rank 1 | 2Tx, Rank 2 | Option1:  2Tx, rank2 for both carriers  Option 2:  1Tx with rank1 for carrier with lower power  2Tx with rank2 for another carrier  Option 3: rank 1 for both carriers with 1Tx |
| **Issue 1-1-5:** MCS table and MCS index | Table 1 MCS26 | Table 1 MCS13 | FFS |
| **Issue 1-1-6:** Test metric | 85% of the maximum throughput | 70% of the maximum throughput | 70% of the maximum throughput |

**Issue 1-1-7: Other parameter configurations**

* Proposals (Nokia):
  + Configure both TRS and SSB in PCell and SCell.
    - Reuse Rel-15 PDSCH requirements common configurations for TRS and TCI states
  + Configure 33us received time difference (RTD) between PCell and SCell.
* Agreement:
  + Reusing test set-up from existing CA demodulation requirements for TRS and SSB configuration
  + Configure 33us received time difference (RTD) between PCell and SCell.

**R4-2313876 WF for NonCol\_intraB\_ENDC\_NR\_CA\_Demod**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Approved.**

### 8.12 Enhanced NR support for high speed train scenario in frequency range 2

#### 8.12.5 Demodulation performance requirements

##### 8.12.5.1 General and channel modelling

**R4-2312199 On Channel Modelling in HST FR2 Enhanced**

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

**Decision: Noted.**

**R4-2312210 View on channel modeling for Rel-18 FR2 HST demodulation requirement in tunnel scenario**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312493 FR2 HST Enh. UE Demod: General and Channel Modeling**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2313088 FR2 HST Enh. UE Demod Simulation Results**

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

**Decision: Noted.**

**R4-2313654 Discussion on deployment and channel modelling for HST FR2**

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

**Decision: Noted.**

##### 8.12.5.2 PDSCH requirements with CA

**R4-2312207 Discussion and simulation results for PDSCH with CA**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312211 Simulation results summary for Rel-18 FR2 HST demodulation requirement**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312494 FR2 HST Enh. UE Demod for CA**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2312792 Simulation results of CA PDSCH demodulation requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312795 [NR\_HST\_FR2\_enh-Perf] HST FR2 Enhanced: UE Demodulation PDSCH Requirements with Carrier Aggregation**

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

**Abstract:**

In this paper, we provide our views on Issues related to HST FR2 with Carrier Aggregation

**Decision: Noted.**

**R4-2312798 [NR\_HST\_FR2\_enh-Perf] Simulation Results on HST FR2 Enhanced with Carrier Aggregation**

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

**Decision: Noted.**

**R4-2313655 Discussion on UE PDSCH CA demodulation requirements for HST FR2**

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

**Decision: Noted.**

**R4-2313656 Simulation results on UE PDSCH CA demodulation requirements for HST FR2**

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

**Decision: Noted.**

##### 8.12.5.3 PDSCH requirements with multi-Rx Chain DL reception

**R4-2312208 Discussion and simulation results for PDSCH requirements with multi-Rx reception**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312495 FR2 HST Enh. UE Demod with simultaneous multi-panel reception**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2312793 UE demodulation requirements for FR2 HST multi-Rx reception**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312796 [NR\_HST\_FR2\_enh-Perf] HST FR2 Enhanced: UE Demodulation PDSCH Requirements with Multi-Rx Chain DL Reception**

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

**Decision: Noted.**

**R4-2312797 [NR\_HST\_FR2\_enh-Perf] Simulation Results on HST FR2 Enhanced with Multi-Rx Chain DL Reception**

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

**Decision: Noted.**

**R4-2313657 Discussion on UE PDSCH requirements with multi-Rx demodulation requirements for HST FR2**

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

**Decision: Noted.**

**R4-2313658 Simulation results for PDSCH requirements with Multi-Rx for HST FR2**

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

**Decision: Noted.**

##### 8.12.5.4 Demodulation aspects for tunnel deployment scenario

**R4-2312200 On Demodulation Aspects of Tunnel Deployment Scenarios in HST FR2 Enhanced**

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

**Decision: Noted.**

**R4-2312209 View on demodulation requirements for tunnel deployment scenario for Rel-18 FR2 HST**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312496 FR2 HST Enh. UE Demod with Tunnel Deployment**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2312794 Tunnel deployment scenario for FR2 HST enhancements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313659 Discussion on reference tunnel deployment scenario**

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

**Decision: Noted.**

#### 8.12.6 Moderator summary and conclusions

**[108][324] NR\_HST\_FR2\_enh\_Demod, AI 8.12.5**

**R4-2314260 Topic summary for [108][324] NR\_HST\_FR2\_enh\_Demod**

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

**Decision: Noted.**

**Issue 1-1-1: Channel model for demodulation requirement for PDSCH with simultaneous multi-Rx reception**

* Proposals
  + Option 1 (Samsung, QC, Ericsson): Use the modified channel models for simultaneous multi-Rx reception scenario

|  |  |
| --- | --- |
| **Panel 1** |  |
| **Panel 2** |  |

* Agreement
  + Option 1 agreed

**Issue 1-1-2: Starting point for channel model for PDSCH requirements with Multi-Rx Reception**

* Observations
  + Observation 1 (Nokia): Doppler profile expressions already agreed for HST FR2 two-panel reception are aligned with each other.
  + Observation 2 (Samsung): Two switching points happens within one Ds moving period in case starting point corresponding to t=0 is D\_s
* Proposals
  + Option 1 (Nokia, Samsung): The starting point corresponding to t=0 is D\_s-D\_(s\_offset ) to the right from RRH k-1 and D\_(s\_offset )+D\_s to the left from RRH k.
    - Option 1a (Samsung): Set the starting point at the switching point of served RRHs
* Agreement
  + Option 1

**Issue 1-1-3: Whether need to include relative power for channel model for PDSCH requirements with Multi-Rx Reception**

* Observations
  + Observation 1 (Nokia):
    - In bi-directional HST FR2 deployments when PC6 UE receives DL signals with two panels, it cannot be assumed the channel is symmetrical, i.e., a significant power imbalance between the UE panels can be present
    - Since UE in HST FR2 scenarios is tested in moving conditions (time-dependent Doppler profiles are defined) it is not realistic that the receiving power at both panels stays the same.
  + Observation 2 (Q C):
    - Relative power was not considered in HST DPS for either FR1 and FR2 channel modelling
* Proposals
  + Option 1 (Samsung, QC)
    - RAN4 should not model RRH power in FR2 HST DPS with simultaneous reception;
  + Option 2 (Nokia, Huawei)
    - RAN4 to introduce power profile per RRH and per UE panel in addition to Doppler shift profiles.
* Discussion
  + Ericsson: We are not sure how to set-up stable SNR during test with variable power level during test. In FR1 HST-SFN, we have introduced variable power for different paths meanwhile the received power in Rx side is constant. We also have concern how to set-up MCS given RAN4 introduced FRC test.
  + QC: We share similar view as Ericsson. The situation is same as Rel-17 FR2 HST with 2 panels activated.
  + Huawei: Our consideration was to take similar approach as FR1 HST\_SFN with constant total received power. We believe still feasible to introduce fixed MCS.
  + Nokia: One starting point we do have multi-channel profile in FR1 HST meanwhile we didn’t consider in FR2 HST. Considering the FR2 HST condition, we think relative power level can be used to model power profile. MCS can be decided based on channel power profile set-up and simulation as legacy approach. We can consider a simple way with two MCSs during test.
  + Ericsson: To Huawei, it’s different compared to FR1 HST-SFN, now we have separate two RF chain and two TRP with separate processing which different compared to FR1 HST-SFN. If we fixed MCS and variable power level, not sure how to specify requirements. To Nokia, the proposal is not traditional FRC based on demodulation test, it’s CQI with VRC test.
  + QC: We share similar view as Ericsson. In FR1 HST-SFN, we have single receiver chain to receiver all the paths. We need to clarify each receiver chain will process separating.
  + Samsung: We agree with the observations from Nokia for deployment. Meanwhile we have similar concern as Ericsson for test feasibility. We can consider different MCS levels for two Rx chain with fixed power.
  + Nokia: We are open to discuss alternative approach.
* Agreement: Further discuss whether and how to model power profile across Rx chains under demodulation test cases with fixed FRC
  + Test feasibility need to be taken into account when selecting suitable test set-up.

**Issue 1-1-5: Requirements need to be introduced for scenario A and scenario B in Bi-directional deployment scenario for PDSCH demodulation requirement**

* Observations
  + Observation 1 (Samsung):
    - Scenario B-1 is more challenge with large doppler jump around the switching point
  + Observation 2 (QC)
    - Scenario A has a larger range of doppler shift variation compared to Scenarios B-1, B-2;
  + Observation 3 (Ericsson)
    - No performance difference among Scenario A, Scenario B-1, and Scenario B-2
* Proposals
  + Option 1 (Samsung, QC, Ericsson, Huawei): Define single requirement for scenario A and scenario B in Bi-directional deployment scenario for PDSCH demodulation requirements
    - Option 1a (Samsung, Huawei, Ericsson): only considering Scenario B-1 for requirement
    - Option 1b (QC): only considering Scenario A for requirement
  + Option 2 (Nokia): RAN4 stive to define necessary minim of channel conditions for PDSCH requirements with two-panel UE reception
    - Define requirement for both scenario A and scenario B, with test applicability rule introduced
* Recommended WF
  + Define single requirement for scenario A and scenario B in Bi-directional deployment scenario for PDSCH demodulation requirements, considering Scenario B-1 for requirement?
* Discussion:
  + Ericsson: We evaluate both options and didn’t observe any performance difference and we are fine to introduce requirements with B-1.
* Agreement: Define single requirement for scenario A and scenario B in Bi-directional deployment scenario for PDSCH demodulation requirements, considering Scenario B-1 for requirement

**Issue 2-1-2: Channel Bandwidth for CA requirement**

* Proposals
  + Option 1 (Nokia):
    - If the simulation results from all interested companies are showing same trends and similar performances for 50 MHz, 100 MHz and 200 MHz, RAN4 may consider selecting one bandwidth from those three to be defined for the CA requirements in the specifications, with an additional note that the same requirements apply to the other two bandwidth sizes
    - RAN4 to define CA requirements for 400MHz in the final specification
  + Option 2 (agreement in previous meeting)
    - Specify CA PDSCH requirements for FR2 HST with component carrier configuration as
      * {50, 100, 200, 400} MHz for 120KHz SCS
* Discussion:
  + Nokia: The agreement can be there, we proposed if all companies result show no difference among different CHBWs, then single requirement can be specified. But we can check the results.

**Issue 3-1-1: UE processing assumption for the FFT window**

* Observations
  + Observation 1 (Nokia)
    - As CPE will be more advanced than regular UE devices, it is expected that it could afford more advanced technologies, including having independent FFT per panel and the ability to process larger range of maximum reception time difference, from less than half CP to more than one CP.
    - The already agreed scheme for HST FR2 with multi-RX is mDCI, which is not bounded to have less than half CP (or one CP) requirements, i.e., it is more flexible than sDCI in terms of the reception time difference between TRPs.
    - Adding additional margin to accommodate less probable implementation will make the requirements too loose.
* Proposals
  + Option 1 (QC, Nokia, Samsung): On UE Processing assumptions for the FFT window, RAN4 should
    - Nokia:
      * RAN4 shall consider maximum reception time difference to be larger than one CP for the requirements, which is considered as a more challenging scenario in the demodulation process (than less-than-one-CP).
      * RAN4 should consider defining requirements by (as far as possible) avoiding additional margin for offsetting different implementations, because such an additional margin will make the requirements to be too loose.
    - Samsung
      * Independent FFT window for each panel should be effective solution for UE to handle the scenario the reception time difference between different TRPs is larger than one CP
  + Option 2 (Huawei):
    - Do not specify baseline UE processing assumption for the FFT window and leave it to UE implementation for FR2 HST performance requirements definition. In case large span is observed, additional margin should be added.
* Discussion
  + QC: I’m not sure what’s previous agreement on processing assumption? Separate processing per panel?
  + Nokia: We agreed without inter-TRP interference and separate FFT processing per Rx chain.
  + Ericsson: In Rel-18 multi-Rx chain WI, RTD assuming within CP which means joint processing still feasible. For Rel-18 FR2 HST WI, RTD larger than CP which means sperate FFT per Rx chain required.
  + Huawei: When UE closed to TRP, large time difference and power difference can be observed. We prefer to keep it as UE implementation.
  + Ericsson: We would like to know the performance difference with different assumption single FFT vs separate FFT.
* Agreement:
  + Encourage companies to evaluate the performance difference with assumption on FFT (single FFT across Rx chains, and separate FFT per RF chain)

**Issue 3-2-1: Transmission schemes**

* Proposals
  + Option 1 (QC):
    - RAN4 should define requirements covering the mandatory sDCI behaviour, if optional mDCI requirements are defined;
  + Option 2 (Huawei, Samsung, Ericsson, Nokia):
    - Do not consider single-DCI based multi-TRP scheduling and RAN4 do not need to consider test applicability rule to accommodate sDCI.
* Discussion
  + QC: sDCI with multi-TRP is baseline for multi-TRP schemes, we may loss test coverage if only introducing multi-DCI based scheme.
* Agreement: Option 2.

**Issue 3-2-3: PDSCH resource scheduling for requirements**

* Proposals
  + Option 1 (Samsung): Both non-overlapping and full-overlapping scheduling requirement can be introduced, introduce test applicability rule for non-overlapping and full-overlapping based on UE capability
    - If UE can support full-overlapping scheduling for mDCI, the mDCI with non-overlapping can be skipped
  + Option 2(Ericsson, Huawei, QC, Nokia): full overlapping
* Discussion:
  + Huawei: We didn’t observe performance gain under non-overlapping based on Rel-17 FR1 HST evaluation. DPS scheme has more advantage.
  + Samsung: For FR2 multi-DCI scheme, full overlapping and non-overlapping are sperate.
  + Ericsson: We understand different UE capability, meanwhile it’s a special CPE device.
  + Nokia: If we already agreed no joint processing, then no difference with fully overlapping and non-overlapping. We can further discuss UE capability for this specific scenario.
* Agreement:
  + Only cover full overlapping

**Issue 3-2-6: PDSCH rate matching in mTRP transmission**

* Proposals
  + Option 1 (Samsung):
    - Option 1 can be considered for full over-overlapping scheduling as baseline
* Agreement:
  + Option 1 agreed

**Issue 3-2-7: PDSCH scheduling and Number of DMRS in TDD DL special slot**

* Proposals
  + Option 1 (Samsung):
    - PDSCH scheduling in the special DL slot is assumed with 3 DMRS configuration
* Agreement
  + Option 1

**Issue 3-2-8: Number of SSB and TCI state configuration for each cell**

* Proposals
  + Option 1 (Samsung):
    - maximum 8 SSB and TCI states configuration for each cell is configured
* Agreement
  + Option 1

**Issue 3-2-9: Number of active TCIs tracking**

* Proposals
  + Option 1 (QC):
    - RAN4 to assume the baseline behavior for FR2 HST UE under test is to track 2 Active TCI states, one per panel
* Discussion
  + QC: Our proposal is to only track one TCI per panel.
  + Huawei: In Rel-17 we have DPS 1a and 1b schemes; for FR2 HST UE, we can consider 2 or 4 TCI states based on UE capability for TCI switching.
  + Samsung: We understand the points from Huawei. For multi-panel case, we consider total 4 TCI states can be feasible.
  + Ericsson: It’s pending on TCI switching and scheduling. From demodulation requirements no big impact, meanwhile this will impact TCI switching performance.

**Issue 3-2-13: Power scaling for two served RRH**

* Proposals
  + Option 1 (Ericsson): apply a constant scaling factor to the transmitted PDSCH signal from each TRxP, as same as Rel-16 multi-TRP SDM transmission scheme
* Agreement:
  + Option 1

**R4-2313918 Ad-hoc minutes for FR2 HST demodulation**

*Type: other For: Approval  
 Source: Samsung*

**Decision: Approved.**

**R4-2313919 WF for FR2 HST demodulation**

*Type: other For: Approval   
 Source: Samsung*

**Decision: Approved.**

**R4-2313920 Simulation assumption for FR2 HST demodulation**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Approved.**

### 8.13 Air-to-ground network for NR

#### 8.13.3 BS RF requirements

Draft CR to TS 38.104

**R4-2311606 Draft CR for TS 38.104, On ATG BS requirements**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: CATT*

**Decision: Merged (with R4-231xxxx).**

**R4-2311803 Draft CR for TS 38.104 on adding RF requirements for ATG BS**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: CMCC, ZTE, CATT, Huawei*

**Decision: Endorsed.**

**R4-2313167 Draft CR to TS38.104 Introduction of ATG BS**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: ZTE Corporation*

**Decision: Merged (with R4-231xxxx).**

Session chair note: R4-2311458~2311461 move to this AI from AI 8.13.2

**R4-2311459 draft CR for 38104 to inoduce ATG BS**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged (with R4-231xxxx).**

Draft CR to TS 38.141-1

**R4-2311460 draft CR for 38141-1 to inoduce ATG BS**

*Type: draftCR For: Endorsement  
 38.141-1 v18.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged (with R4-231xxxx).**

**R4-2311607 Draft CR for TS 38.141-1, On ATG BS requirements**

*Type: draftCR For: Endorsement  
 38.141-1 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: CATT*

**Decision: Revised to R4-2313907 (from R4-2311607).**

**R4-2313907 Draft CR for TS 38.141-1, On ATG BS requirements**

*Type: draftCR For: Endorsement  
 38.141-1 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: CATT, Huawei, ZTE, CMCC*

**Decision: Endorsed.**

Draft CR to TS 38.141-2

**R4-2311461 draft CR for 38141-2 to inoduce ATG BS**

*Type: draftCR For: Endorsement  
 38.141-2 v18.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged (with R4-231xxxx).**

**R4-2313908 draft CR for 38141-2 to introduce ATG BS**

*Type: draftCR For: Endorsement  
 38.141-2 v18.2.0 CR- rev Cat: (Rel-18)  
  
 Source: ZTE, CMCC, CATT, Huawei, HiSilicon*

**Decision: Endorsed.**

TP to TR 38.876

**R4-2311458 TP for 38.876 on BS RF requirement**

*Type: draftCR For: Endorsement  
 38.876 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

#### 8.13.5 Demodulation performance requirements

##### 8.13.5.1 General aspects

**R4-2311503 Discussion on ATG scenarios**

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

**Decision: Noted.**

**R4-2311794 Discussion on general issues for ATG**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2311795 Summary of simulation results for ATG UE and BS demodulation requirements**

*Type: other For: Information  
 Source: CMCC*

**Decision: Noted.**

**R4-2312063 Discussion on ATG general demodulation issues**

*Type: other For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312497 ATG UE Demod: General**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2313646 Discussion on general aspects for NR ATG demodulation requirements**

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

**Decision: Noted.**

##### 8.13.5.2 UE demodulation performance and CSI requirements

**R4-2311504 Discussion on ATG UE demodulation**

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

**Decision: Noted.**

**R4-2311505 Simulation results for ATG UE demodulation**

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

**Decision: Noted.**

**R4-2311796 Discussion on UE demodulation and CSI requirements for ATG scenario**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2311797 Simulation results for ATG PDSCH demodulation**

*Type: discussion For: Information  
 Source: CMCC*

**Decision: Noted.**

**R4-2312498 ATG UE Demod: UE Demod and CSI requirements**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

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

**R4-2312549 On UE demodulation requirements for ATG network**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312550 Simulation results for ATG PDSCH demodulation requirements**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313089 ATG UE Demod Simulation Results**

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

**Decision: Noted.**

**R4-2313647 Discussion on NR UE ATG demodulation requirements**

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

**Decision: Noted.**

**R4-2313648 Simulation results on NR UE ATG demodulation requirements**

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

**Decision: Noted.**

##### 8.13.5.3 BS demodulation performance requirements

**R4-2311510 Discussion on ATG BS demodulation performance requirements**

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

**Decision: Noted.**

**R4-2311511 Simulation results for ATG BS demodulation requirements**

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

**Decision: Noted.**

**R4-2311798 Discussion on BS demodulation requirements for ATG scenario**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2311799 Simulation results for ATG PUSCH demodulation**

*Type: discussion For: Information  
 Source: CMCC*

**Decision: Noted.**

**R4-2312064 Discussion on ATG BS demodulation issues**

*Type: other For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312065 Simulation results for ATG PUSCH demodulation**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2312204 Discussion and simulation results for BS demodulation requirements for Rel-18 ATG**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2313649 Discussion on NR BS ATG demodulation requirements**

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

**Decision: Noted.**

**R4-2313650 Simulation results on NR BS ATG demodulation requirements**

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

**Decision: Noted.**

#### 8.13.6 Moderator summary and conclusions

**[108][303] NR\_ATG\_BSRF, AI 8.13.3**

**R4-2314239 Topic summary for [108][303] NR\_ATG\_BSRF**

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

**Decision: Noted.**

**[108][325] NR\_ATG\_Demod, AI 8.13.5**

**R4-2314261 Topic summary for [108][325] NR\_ATG\_Demod**

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

**Decision: Noted.**

**Topic #1 General aspect**

**Issue 1-1: Channel model**

* Proposals
  + Option 1: Do not consider Doppler shift in ATG UE Demod Requirements (QC)
* Discussion
  + QC: We didn’t see technical reason to introduce test case with constant doppler shift. Test set-up also not clear for us.
  + CMCC: This agreement following the assumption with 0.1 ppm FOE in RF session. We already make agreements in previous meeting even QC proposed same thing. Better not have back and forth debate.
  + QC: The justification not clear for us.
  + Ericsson: We share similar view as CMCC. This is aligned with previous assumption with 0.1 ppm.
  + Samsung: We support previous agreements.

**Issue 1-2: TDD pattern 30D4S6U**

* Proposals
  + Option 1: RAN4 should not define ATG UE Demodulation requirements with 30D4S6U TDD Slot Pattern (QC)
  + Option 2: If RAN4 introduces ATG UE Demodulation requirements which require >16 HARQ processes, these should be optional based on UE capability (QC)
  + Option 3: Wait RAN1 response to the LS and then discuss how to define the cases with new TDD pattern. If RAN1 response that “Increasing the number of HARQ processes” and “K1 range extension” issue can be solved by existing NTN solution, define corresponding demodulation requirements with the new TDD pattern and note should be added in the specification that this pattern is for ATG scenario only. (HW)
* Discussion:
  + Ericsson: We also need to align the assumption in RRM session.
  + CMCC: This is aligned with RRM session conclusion.
* Agreement:
  + Wait RAN1 response. If RAN1 response that “Increasing the number of HARQ processes” and “K1 range extension” issue can be solved by existing NTN solution, consider to define corresponding demodulation requirements with the new TDD pattern and note should be added in the specification that this pattern is for ATG scenario only, these requirements should be optional based on UE capability

**Issue 1-4: Applicability rule for antenna configuration**

* Proposals
  + Option 1: 2Rx can be skipped if the test of 4Rx is passed for the ATG CPE supporting both 2Rx and 4Rx (ZTE)
* Agreement
  + Option 1 can be agreed.

**Issue 1-6: Manufactory declaration for ATG BS**

* Proposals
  + Option 1: Introduce a new manufactory declaration for ATG BS. I.e., in TS38.141-1 (Ericsson)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.xxx | Air-to-ground scenario | Declaration of air-to-ground scenario support, i.e. ATG support or no ATG support | x | x |

* Discussion
  + Samsung: We support option1.
  + Huawei: We are also fine.
* Agreement: Option 1

**Topic #2 UE demodulation**

**Issue 2-1-1: MCS**

* Proposals
  + Option 1: For 256QAM, use MCS 27 in Table 2. (CMCC)
  + Option 2: Consider MCS24 (Table-2) for defining requirements for 256QAM (Ericsson, HW)
* Agreement:
  + Option 2 agreed

**Issue 2-1-2: Test scope for PDSCH**

* **Proposals for new incremental requirements:**
  + Option 1: following test cases for new PDSCH requirements: (CMCC)

|  |  |  |
| --- | --- | --- |
| FDD  10 MHz 15kHz SCS | 2T2R, 2T4R | 16QAM (MCS [13] in table 1) |
| 64QAM (MCS [22] in table 1) |
| 256QAM (MCS [27] in table 2) |

|  |  |  |  |
| --- | --- | --- | --- |
| TDD  40MHz 30kHz SCS | 7D1S2U  &  New TDD pattern: 30D4S6U(if introduced) | 2T2R, 2T4R | 16QAM (MCS [13] in table 1) |
| 64QAM (MCS [22] in table 1) |
| 256QAM (MCS [27] in table 2) |

* + Option 2: Only test cases with MCS 16QAM to configure new TDD pattern. Propose following test cases for new PDSCH requirements: (Ericsson)

|  |  |  |
| --- | --- | --- |
| FDD  10 MHz 15kHz SCS | 2T2R, 2T4R | 16QAM (MCS [13] in table 1) |
| 64QAM (MCS [22] in table 1) |
| 256QAM (MCS [24] in table 2) |

|  |  |  |  |
| --- | --- | --- | --- |
| TDD  40MHz 30kHz SCS | New TDD pattern: 30D4S6U(if introduced) | 2T2R, 2T4R | 16QAM (MCS [13] in table 1) |
| 7D1S2U | 64QAM (MCS [22] in table 1) |
| 256QAM (MCS [24] in table 2) |

* **Proposals for reusing requirements:**
  + Option 1: no need to further choose existing PDSCH test case for ATG reusing (CMCC)
  + Option 2: Select the following test cases for ATG UE requirements. (HW)
    - Test num 1-3 and 1-4 in Table 5.2.2.1.1-3 (2R FDD)
    - Test num 1-3 and 1-4 in Table 5.2.2.2.1-3 (2R TDD)
    - Test num 1-3 and 1-4 in Table 5.2.3.1.1-3 (4R FDD)
    - Test num 1-3 and 1-4 in Table 5.2.3.2.1-3 (4R TDD)
  + Option 3: Considering that there is no 64QAM rank 1 case in Rel-15 TS 38.101-4, define new requirements for 64QAM by reusing the existing 64QAM rank2 case but change the rank to rank1. (HW)
  + Option 4: Consider the following legacy tests to be applicable to ATG UEs (QC)
    - Test num 1-1, 1-3 and 1-4 in Table 5.2.2.1.1-3, Test num 2-1 in Table 5.2.2.1.1-4 (2R FDD)
    - Test num 1-1, 1-3 and 1-4 in Table 5.2.2.2.1-3, Test num 2-1 in Table 5.2.2.2.1-4 (2R TDD)
* Discussion
  + Ericsson: If UE can pass existing fading channel requirements, then why UE need to test under new requirements with AWGN channel condition.
  + Huawei: reusing existing requirements is previous agreement. We follow previous agreement to select proper test cases.

Agreement:

* + For new incremental requirements:
    - introduces following test cases for new PDSCH requirements (MCS for 256QAM further follows the agreement of Issue 2-1-1):

|  |  |  |
| --- | --- | --- |
| FDD  10 MHz 15kHz SCS | 2T2R, 2T4R | 16QAM (MCS [13] in table 1) |
| 64QAM (MCS [22] in table 1) |
| 256QAM (MCS [24] in table 2) |

|  |  |  |  |
| --- | --- | --- | --- |
| TDD  40MHz 30kHz SCS | 7D1S2U  &  New TDD pattern for ATG specific scenario e.g. flexible TDD configuration or 30D4S6U(if introduced) | 2T2R, 2T4R | 16QAM (MCS [13] in table 1) |
| 64QAM (MCS [22] in table 1) |
| 256QAM (MCS [24] in table 2) |

**Issue 2-2-1: Test scope for PDCCH**

* Proposals
  + Option 1: To consider legacy PDCCH requirements for ATG PDCCH requirements. (ZTE, Ericsson)
    - 2T2R FDD: All test cases in 5.3.2.1.2
    - 2T4R FDD: All test cases in 5.3.3.1.2
    - 2T2R TDD: All test cases in 5.3.2.2.2
    - 2T4R TDD: All test cases in 5.3.3.2.2
  + Option 2: Select following legacy test cases for ATG UEs (CMCC)
    - 1T2R FDD: Test number 2, 3 and 4 in 5.3.2.1.1
    - 2T2R FDD: All test cases in 5.3.2.1.2
    - 1T2R TDD: Test number 1 and 2 in 5.3.2.2.1
    - 2T2R TDD: All test cases in 5.3.2.2.2
    - 1T4R FDD: Test number 2, 3 and 4 in 5.3.3.1.1
    - 2T4R FDD: All test cases in 5.3.3.1.2
    - 1T4R TDD: Test number 1 and 2 in 5.3.3.2.1
    - 2T4R TDD: All test cases in 5.3.3.2.2
  + Option 3: Select following legacy test cases for ATG UEs (HW)
    - 1T2R FDD: Test number 1, 3 and 5 in 5.3.2.1.1
    - 2T2R FDD: Test number 3 in 5.3.2.1.2
    - 1T2R TDD: All test cases in 5.3.2.2.1
    - 2T2R TDD: All test cases in 5.3.2.2.2
    - 1T4R FDD: Test number 1, 3 and 5 in 5.3.3.1.1
    - 2T4R FDD: Test number 3 in 5.3.3.1.2
    - 1T4R TDD: All test cases in 5.3.3.2.1
    - 2T4R TDD: All test cases in 5.3.3.2.2
  + Option 4: Do not consider in the ATG scope legacy PDCCH requirements (QC)
* Discussion:
  + QC: This is similar as previous discussion. PDCCH requirements can be verified implicitly under PDSCH requirements.
  + CMCC: We are not planning to introduce new requirements for PDCCH. Pick up some of existing requirements to verify PDCCH performance.
  + Ericsson: We share similar view as CMCC.
  + ZTE: We have same view as CMCC.
  + QC: Why we consider different test condition for PDCCH and PDSCH?

**Issue 2-3-1: Test scope for CSI reporting**

* Proposals
  + Option 1: CSI reporting such PMI and CQI is feasible for ATG scenario. (ZTE)
  + Option 2: reuse the legacy CSI reporting requirements under AWGN propagation condition, which including (CMCC)
    - 2T2R FDD: CQI requirements in 6.2.2.1.1.1
    - 2T2R TDD: CQI requirements in 6.2.2.2.1.1
    - 2T4R FDD: CQI requirements in 6.2.3.1.1.1
    - 2T4R TDD: CQI requirements in 6.2.3.2.1.1
  + Option 3: Reuse the CSI reporting cases for ATG scenario from the existing legacy CSI reporting cases. (HW)
  + Option 4: Do not consider in the ATG scope legacy CSI reporting requirements (QC)
* Discussion:
  + Huawei: We proposed not consider RI requirements given only rank1 considered.
  + Ericsson: We support recommended WF and also agree with Huawei.
* Agreement:
  + For CQI requirements, reuse the following requirements:
    - 2T2R FDD: CQI requirements in 6.2.2.1.1.1
    - 2T2R TDD: CQI requirements in 6.2.2.2.1.1
    - 2T4R FDD: CQI requirements in 6.2.3.1.1.1
    - 2T4R TDD: CQI requirements in 6.2.3.2.1.1
  + Not introduce RI requirements for ATG UE
  + FFS for PMI requirements

**Topic #3 BS demodulation**

**Issue 3-1: MCS**

* Proposals
  + Option 1: Capture 256QAM demodulation requirements for ATG PUSCH. Whether to test it is based on the manufactory declaration. (Ericsson, ZTE, CMCC, HW)
    - Option 1-1: For the new test case with new dedicated ATG requirement, cover 256QAM, MCS 22 in table 2 (CMCC)
  + Option 2: Only consider 64QAM MCS28 and 256QAM MCS22 for ATG PUSCH demodulation requirements. (Ericsson)
  + Option 3: For new dedicated requirement, only one feasible MCS was introduced. (Samsung)
* *Observation from Moderator: The agreement from RAN4#107*
  + *For the test case which reusing existing requirements, cover 16QAM, 64QAM at least*
    - *FFS for 256QAM supporting pending on UE RF session conclusion on the supporting UL 256QAM Tx*
  + *For the new test case with new dedicated ATG requirement, cover 16QAM and 64QAM at least* 
    - *FFS for 256QAM supporting pending on UE RF session conclusion on the supporting UL 256QAM Tx*
* Discussion:
  + Samsung: If existing requirements can be passed, why new dedicated requirements need to be considered? We proposed to consider 256QAM MCS 22 only for new dedicated ATG requirements.
  + Ericsson: We agree with Samsung, 16QAM not needed for new dedicated ATG requirements. For 64QAM, and 256QAM we proposed to consider higher MCS. 256QAM is optional based on manufactory declaration, better to cover 64QAM as well in new dedicated requirements.
  + Samsung: If both 64QAM and 256 QAM both feasible, then can we choose the highest modulation orders? We do see the limitation on test able SNR range.
  + Ericsson: In RF session, 256QAM agreed as optional feature for ATG UE. For testable SNR, we didn’t see any issue. We observe similar SNR for 64QAM MCS [28] (Table 1) and 256QAM MCS [22] (Table 2).
* Agreement:
  + For the test case which reusing existing requirements, cover 16QAM, 64QAM and 256QAM, whether to test 256QAM based on the manufactory declaration.
  + For the new dedicated ATG requirements, cover [64QAM MCS [28] (Table 1)] and 256QAM MCS [22] (Table 2), whether to test 256QAM based on the manufactory declaration.

**Issue 3-2: Test metric**

* Proposals
  + Option 1: Only consider 70% throughput requirements for new dedicated requirements. (ZTE, CMCC, Samsung, HW)
  + Option 2: For the test case which reusing existing requirements, the test metric cover SNR at 70% and 30% TP. (CMCC, HW, Ericsson)
* Agreement:
  + For the test case which reusing existing requirements, the test metric cover SNR at 70% and 30% TP.
  + Only consider 70% throughput requirements for new dedicated requirements.

**Issue 3-3: Test scope for PUSCH**

* Proposals for new incremental requirements
  + Option 1: Introduce following new dedicated requirements for PUSCH, which are separately for FDD and TDD cases. (CMCC)

|  |  |  |
| --- | --- | --- |
| FDD  5 MHz 15kHz SCS  AWGN+200Hz doppler | 1T2R | 16QAM (MCS [16] in table 1) |
| 64QAM (MCS [28] in table 1) |
| 256QAM (MCS [22] in table 2) |

|  |  |  |  |
| --- | --- | --- | --- |
| TDD  10MHz 30kHz SCS  AWGN+500Hz doppler | 7D1S2U  &  FFS on new TDD pattern: 30D4S6U | 1T2R | 16QAM (MCS [16] in table 1) |
| 64QAM (MCS [28] in table 1) |
| 256QAM (MCS [22] in table 2) |

* + Option 2: Reuse current applicability rule “The same requirements are applicable to FDD and TDD with different UL-DL patterns” for Rel-18 ATG BS demodulation requirements. (Ericsson)
  + Option 3: Reusing the legacy TDD pattern for requirement in ATG scenario as “The same requirements are applicable to TDD with different UL-DL pattern”(Samsung)
* Proposals for legacy requirements reusing
  + Option 1: To consider normal PUSCH demodulation and UCI multiplexing on PUSCH as mandatory requirements. (ZTE, CMCC)
* Discussion:
  + Ericsson: We think same requirements applicable for both FDD and TDD.
  + Samsung: The doppler shift value is different between FDD and TDD, not sure whether same requirements still applicable.
* Agreement
  + For new incremental requirements:
    - The same requirements are applicable to TDD with different UL-DL pattern
  + For legacy requirements reusing:
    - Consider normal PUSCH demodulation and UCI multiplexing on PUSCH as mandatory

**R4-2313875 WF for ATG demodulation requirements**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Approved.**

### 8.14 NR support for dedicated spectrum less than 5MHz for FR1

#### 8.14.3 BS RF requirements

LS to ECC WG FM

**R4-2311210 UIC input related to R4-2311003 LS from WGFM**

*Type: discussion For: Discussion  
 Source: Union Inter. Chemins de Fer*

**Decision: Noted.**

**R4-2311667 Reply LS on NR bandwidth smaller than 5 MHz at 900 MHz**

*Type: LS out For: Approval  
 to CEPT ECC WG FM, cc RAN  
 Source: Nokia, Nokia Shanghai Bell, UIC*

**Decision: Revised to R4-2313910 (from R4-2311667).**

**R4-2313910 Reply LS on NR bandwidth smaller than 5 MHz at 900 MHz**

*Type: LS out For: Approval  
 to CEPT ECC WG FM, cc RAN  
 Source: Nokia, Nokia Shanghai Bell, UIC*

**Decision: Approved.**

**R4-2313595 Draft reply LS to the ECC WG FM on less than 5MHz BS requirements**

*Type: LS out For: Approval  
 to ECC WG FM, cc ETSI TC ERM, ETSI TC RT, UIC UGFA, 3GPP TSG RAN  
 Source: Huawei, HiSilicon*

Session chair note: Move to this AI from AI 10.2.3.

**Decision: Noted.**

**R4-2313244 Spectrum less than 5 MHz - LS Reply to ECC WG FM**

*Type: LS out For: Approval  
 to ECC WG FM  
 Source: Ericsson*

**Decision: Noted.**

**R4-2311668 BS RF requirements for NR support for dedicated spectrum less than 5MHz for FR1**

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

**Decision: Noted.**

Draft CR to TS 38.104

**R4-2312019 draftCR to TS38.104: the introduction of 3 MHz channel bandwidth**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: ZTE Corporation*

**Decision: Endorsed.**

**R4-2313245 Draft CR to TS 38.104 - Introduction of 3 MHz channel bandwidth**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Endorsed.**

**R4-2311669 Draft CR to TS 38.104 on introduction of 3 MHz channel bandwidth in clauses 6.3 and 6.6**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2313593 Draft CR to TS38.104: updated in-band blocking requirements for 3 MHz channel bandwidth (7.4.2)**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2313594 Draft CR to TS38.104: updated RX IMD requirements for 3 MHz channel bandwidth (7.7)**

*Type: draftCR For: Endorsement  
 38.104 v18.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2311670 Big CR to TS 38.104 on introduction of 3 MHz channel bandwidth**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0500 rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

CR to TS 38.133

**R4-2311671 CR to TS 38.113 on introduction of 3 MHz channel bandwidth in clause 6.1**

*Type: CR For: Agreement  
 38.104 v18.2.0 CR-0501 rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2311675 CR to TS 38.113 on introduction of 3 MHz channel bandwidth in clause 6.1**

*Type: CR For: Agreement  
 38.113 v17.4.0 CR-0059 rev Cat: B (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Agreed.**

**R4-2313247 CR to TS 38.113: Introduction of 3 MHz channel bandwidth**

*Type: CR For: Agreement  
 38.113 v17.4.0 CR-0063 rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Merged (with R4-231xxxx).**

#### 8.14.5 Moderator summary and conclusions

**[108][304] NR\_FR1\_lessthan\_5MHz\_BW\_BSRF, AI 8.14.3**

**R4-2314240 Topic summary for [108][304] NR\_FR1\_lessthan\_5MHz\_BW\_BSRF**

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

**Decision: Noted.**

**Issue 1-1: Conducted output power requirements**

* Proposals
  + Option 1: Treat the maximum conducted output power subject as an R18 maintenance item for bands n100 and n101.
  + Option 2: Not to specify in-block conducted output power requirements for 3MHz channel bandwidth in band n100 in RAN4 specifications.
* Agreement:
  + Treat the maximum conducted output power subject as an R18 maintenance item for bands n100 and n101, and not to specify in-block conducted output power requirements for 3MHz channel bandwidth in band n100 in this version of RAN4 specifications.

**Issue 1-2: Additional narrow band blocking requirement**

* Proposals
  + Option 1: To specify the requirement also using the same 3MHz channel bandwidth for both wanted and interfering signals as follows:
    - Interfering signal mean power: -39 dBm
    - Wanted signal mean power (dBm): PREFSENS + 6 dB
    - Interfering Signal: 3 MHz DFT-s-OFDM NR signal, 15 kHz SCS, 1 RB
    - Interfering RB centre frequency offset 874.4 MHz -(255 kHz +m\*180), m=0, 1, 2, 3, 4, 7, 10, 13
  + Option 2: TBA
* Agreement
  + Option 1

**Issue 1-3: Additional narrow band blocking requirement**

* Proposals
  + Option 1: To specify the additional narrow band blocking requirement for 3 MHz channel bandwidth for band n100 as follows:
    - Interfering signal mean power: -39 dBm
    - Wanted signal mean power (dBm): PREFSENS + 6 dB
    - Interfering Signal: 3 MHz DFT-s-OFDM NR signal, 15 kHz SCS, 1 RB
    - Interfering centre frequency offset: 360 kHz for CW, 960 kHz for 1 RB
  + Option 2: TBA
* Agreement
  + Option 1

### 8.15 Enhancement of TRP and TRS requirements and test methodologies

#### 8.15.1 General and work plan

**R4-2311056 TP to TR38.870 on TRP TRS test procedure for CA**

*Type: pCR For: Approval  
 38.870 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei Tech.(UK), Rohde & Schwarz*

**Discussion:**

*Apple: We didn’t check this yet. We are still discussing the WF on the issues.*

*QC: We suggest to focus on WF and postpone this to future meeting.*

*R&S: This is 2nd meeting for discussion on this CR. We suggest to consider this TP as baseline into WF for further discussion.*

**Decision: Postponed.**

**R4-2311228 On the impact of RAN5 LS on TxD and GSMA LS on CBW configurations**

*Type: discussion For: Decision  
 Source: Apple*

**Decision: Noted.**

**R4-2312565 3GPP TR 38.870 v0.4.0**

*Type: draft TR For: Agreement  
 38.870 v0.5.0 CR- rev Cat: (Rel-18)  
  
 Source: vivo*

**Decision:** Email approval

#### 8.15.2 Enhancement of test methodology

##### 8.15.2.1 Anechoic chamber test methodology

**R4-2311230 TP to TR38.870 on MIMO radiated output power metric**

*Type: pCR For: Approval  
 38.870 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Apple*

**Decision: Not pursued.**

**R4-2311057 on TRP for UL MIMO**

*Type: discussion For: Agreement  
 Source: Huawei Tech.(UK)*

**Decision: Noted.**

**R4-2311227 UL MIMO radiated output power metric and test methodology**

*Type: other For: Approval  
 Source: Apple*

**Decision: Noted.**

**R4-2311672 Multi-TPMI TRP time estimation**

*Type: other For: Approval  
 38.870 v CR- rev Cat: (Rel-18)  
  
 Source: Rohde & Schwarz, Keysight Technologies*

**Decision: Noted.**

**R4-2312509 Discussion on TRP test method for UL MIMO and TxD**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312563 (Template) Measurement results for 3GPP Rel-18 TRP TRS AC lab alignment activity**

*Type: other For: Approval  
 Source: vivo*

**Decision: Revised to R4-2313892 (from R4-2312563).**

**R4-2313892 (Template) Measurement results for 3GPP Rel-18 TRP TRS AC lab alignment activity**

*Type: other For: Approval  
 Source: vivo*

**Decision: Approved.**

**R4-2312567 Discussions on AC test method**

*Type: other For: Approval  
 Source: vivo*

**Decision: Noted.**

**R4-2312713 Discussion on 2TX test methodology**

*Type: other For: Approval  
 Source: CAICT.*

**Decision: Noted.**

**R4-2312885 Discussion on FR1 2Tx TRP test method**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2312898 Further discussion on 2TX configuration**

*Type: other For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2312919 On 2Tx TRP test method**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2313628 On FR1 UL-MIMO 2Tx TRP Deviation and ECC**

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

**Decision: Noted.**

**R4-2313775 On Phase Impacts on Single-Layer UL MIMO TRP Measurements and 2Tx Test Mode**

*Type: other For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision: Noted.**

##### 8.15.2.2 Reverberation chamber test methodology

**R4-2311061 Loading of Reverberation Chambers for OFDM signal measurements**

*Type: discussion For: Discussion  
 Source: EMITE, NIST*

**Decision: Noted.**

**R4-2311062 Correction to R4-2304468 Discussion on Coherence bandwidth of RC**

*Type: discussion For: Discussion  
 Source: EMITE*

**Decision: Noted.**

**R4-2312564 (Template) Measurement results for 3GPP Rel-18 TRP TRS RC harmonization activity**

*Type: other For: Approval  
 Source: vivo*

**Decision: Revised to R4-2313893 (from R4-2312564).**

**R4-2313893 (Template) Measurement results for 3GPP Rel-18 TRP TRS RC harmonization activity**

*Type: other For: Approval  
 Source: vivo*

**Decision: Approved.**

**R4-2312568 Further updated working procedure for Rel-18 TRP TRS lab alignment and harmonization campaign**

*Type: other For: Approval  
 Source: vivo*

**Decision: Revised to R4-2313894 (from R4-2312568).**

**R4-2313894 Further updated working procedure for Rel-18 TRP TRS lab alignment and harmonization campaign**

*Type: other For: Approval  
 Source: vivo*

**Decision: Approved.**

**R4-2312920 On RC harmonization activity**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

##### 8.15.2.3 MU assessment

**R4-2311673 TP to TR 38.870 on contents for Annex B**

*Type: pCR For: Approval  
 38.870 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: ROHDE & SCHWARZ*

**Decision: Endorsed.**

**R4-2313263 Enhancements to Rel18 Lab Alignment Template**

*Type: discussion For: Decision  
 Source: Apple*

**Decision: Noted.**

##### 8.15.2.4 Testing time reduction

**R4-2311058 on test time reduction for TxD and UL MIMO**

*Type: discussion For: Agreement  
 Source: Huawei Tech.(UK)*

**Decision: Noted.**

#### 8.15.3 Performance requirements

**R4-2311229 TRP TRS device pool information**

*Type: other For: Approval  
 Source: Apple, Telecom Italia*

**Decision: Noted.**

**R4-2311270 Improvement of the working procedure for Rel-18 AC Lab Alignment Campaign**

*Type: discussion For: Decision  
 Source: TELECOM ITALIA S.p.A.*

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

**R4-2311271 Improvement of the working procedure for TRP TRS Performance Test Campaign**

*Type: discussion For: Decision  
 Source: TELECOM ITALIA S.p.A.*

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

**R4-2311272 Definition of the thresholds related to devices pool**

*Type: discussion For: Decision  
 Source: TELECOM ITALIA S.p.A.*

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

**R4-2312566 TP to TR 38.870 on AC lab alignment campaign**

*Type: pCR For: Approval  
 38.870 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: vivo*

**Decision: Revised to R4-2313988 (from R4-2312566).**

**R4-2313988 TP to TR 38.870 on AC lab alignment campaign**

*Type: pCR For: Approval  
 38.870 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: vivo*

**Decision: Approved.**

**R4-2312569 Schedule for Rel-18 TRP TRS measurement campaigns and requirements**

*Type: other For: Approval  
 Source: vivo*

**Decision: Revised to R4-2313895 (from R4-2312569).**

**R4-2313895 Schedule for Rel-18 TRP TRS measurement campaigns and requirements**

*Type: other For: Approval  
 Source: vivo*

**Decision: Revised to R4-2313997 (from R4-2313895).**

**R4-2313997 Schedule for Rel-18 TRP TRS measurement campaigns and requirements**

*Type: other For: Approval  
 Source: vivo*

**Decision: Approved.**

**R4-2312921 On AC lab alignment activity**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2313784 Improvement of the working procedure for Rel-18 AC Lab Alignment Campaign**

*Type: discussion For: Decision  
 Source: Telecom Italia, Vodafone, China Telecom, AT&T, Orange, Deutsche Telekom, T-Mobile USA*

**Decision: Noted.**

**R4-2313785 Improvement of the working procedure for TRP TRS Performance Test Campaign**

*Type: discussion For: Decision  
 Source: Telecom Italia, Vodafone, China Telecom, AT&T, Orange, Deutsche Telekom, T-Mobile USA*

**Decision: Noted.**

**R4-2313786 Definition of the thresholds related to devices pool**

*Type: discussion For: Decision  
 Source: Telecom Italia, Vodafone, China Telecom, AT&T, Orange, Deutsche Telekom, T-Mobile USA*

**Decision: Noted.**

#### 8.15.4 Moderator summary and conclusions

**[108][330] NR\_FR1\_TRP\_TRS\_enh, AI 8.15**

**R4-2314266 Topic summary for [108][330] NR\_FR1\_TRP\_TRS\_enh**

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

**Decision: Noted.**

**R4-2313886 Ad-hoc minutes for NR\_FR1\_TRP\_TRS\_enh**

*Type: other For: Approval  
 Source: vivo*

**Decision: Approved.**

**Issue 1-2-1: Test method for non-coherent UE support fullpowerMode1 just single TPMI index 2**

* Proposals
  + Proposal 1: For non-coherent UE support fullpowerMode1 TPMI index 2 and has no full power PA of 26dBm, 2Tx antenna transmitting simultaneously TRP testing should be performed with TPMI index=2. [Qualcomm, vivo, CAICT, Xiaomi]
* Discussion:
  + Apple: We want to ensure the performance of UE in reality with UL MIMO under all available indexes.
  + Huawei: For different UE types, we consider separate approach.
  + QC: We understand the demand to verify the UL MIMO performance, but now we are discussing under TRP TRS WI for TRP requirement’s introduction. We can consider separate test metrics step by step.
  + Sony: We have similar view as Huawei.
  + Telecom Italia: We support to have LS.
  + Samsung: RAN1 specification is clear, we didn’t have any necessity on this.

It’s RAN4 common understanding:

PC2 non-coherent UE with full power mode 1:

* Available TPMI indexes: 0, 1,2
* TPMI indexes with 2Tx transmission simultaneously: index 2
* Agreement:
  + Single TPMI index =2 used for testing
    - Using Fixed TPMI index =2 as baseline configuration if TRP requirements introduced in Rel-18
  + RAN4 shall further study and discuss another test metric with swept TPMI indexes for testing and captured into TR
    - Test applicable rules can be further discussed

**Issue 1-2-2: For fully Coherent UE support multiple TPMI index 2~5**

* Proposals
  + Option 1: multi-TPMI based test method
    - Option 1a: measure TRP under each TPMI, and then average TRPs as final performance metric. FFS TPMI index: TPMI 2~5 or 2&3 or 4&5; **[CAICT, vivo: prefer index 2&3 or 4&5] [Qualcomm: 1a as baseline] [OPPO: all TPMI 2~5] [MTK]**
      * FFS the naming of the performance metric, e.g. keep current or new term as combined-TRP
    - ~~Option 1b: measure TRP under each TPMI with index 2~5, no further processing. How to define requirement is FFS. FFS TPMI index: TPMI 2~5 or 2&3 or 4&5;~~
    - Option 1c: measure and record best EIRP at each test point (swept over all applicable TPMIs at each measurement grid), and then integrate all the measured best EIRPs into a TRP-like performance metric. TPMI index 2~5; **[Apple] [OPPO: can be considered in new WI] [CAICT: can be captured in TR as informative method]**
      * FFS the naming of the performance metric, e.g. keep current or new term as FR1 averaged spherical coverage;
  + Option 2: single-TPMI based test method
    - Option 2a: measure TRP under TPMI index 2, as the final performance metric; **[Samsung]**
    - ~~Option 2b: measure TRP under one of TPMI index within 3~5, as the final performance metric;~~
    - New Option 2c: use a single TPMI index selected between 2 and 5 to test two antenna performance with [15% ile] of EIRP CDF as an OTA metric; **[Huawei]**
  + New Option 3: UE-declaration-based test method
    - Option 3a: At least measure TRP under TPMI index 2. Other additional TPMI index (e.g., index 3, or index 3,4,5) can be measured based on UE declaration, then averaging process is needed. FFS averaging details. **[vivo]**
    - New Option 3b: the TRP requirement based on Option 1c, the verification can be declared by UE for certification, for testing time saving (even with single TPMI). **[Apple]**
    - New Option 3c: the TRP requirement defined based on Option 2a. the verification can be declared by UE for better performance. (even with full TPMI index 2~5, besides, O1c can be considered). **[Samsung]**
    - New Option 3d: the TRP requirement defined based on Option 1a. the verification can be declared by UE for better performance. (O1c can be considered). **[CAICT]**
* Discussion:
  + Option 1: With fixed single TPMI index
    - Samsung
  + Option 2: measure TRP under each TPMI, and then average TRPs as final performance metric. FFS TPMI index: TPMI 2~5 or 2&3 or 4&5;
    - Qualcomm, Huawei, CAICT, OPPO, vivo
  + Option 3: measure and record best EIRP at each test point (swept over all applicable TPMIs at each measurement grid), and then integrate all the measured best EIRPs into a TRP-like performance metric. TPMI index 2~5;
    - Apple, Sony, Ericsson, MVG, TMO
* Agreement: Further discuss option 2 and option 3
* New definition/term on test metric required for option 3 need to be further discussed

Samsung: In previous meeting, we already agreed to further evaluate performance and testing time aspect. Based on the input from companies, we do see option 1 is most feasible choice without performance impact and also minimize test effort.

**Issue 1-3-1: 2Tx-based TxD test procedure (first priority)**

* Observations and Proposals
  + *Observation 1: in classical test system with separated link antenna and measurement antenna, the measured TRP of link antenna direction oriented UE TxD implementation would be much worse than its real performance. (Samsung)*
  + **Proposal 1: TRP test method of TxD should accommodate such UE implementation which enables TxD by optimizing phase relationship between antenna ports dynamically depending on the detected AoA of downlink signal in order to achieve better uplink transmission power for that AoA. (Samsung)**
  + **Proposal 2: Feedback from TE vendors and OEMs is needed if it is acceptable to restrict TxD OTA test only with dedicated test system with combined link and measurement antenna. (Samsung)**
  + **Proposal 3: The basic test method for TxD and RxD should be consistent, with all the active antennas ON. (vivo)**

Tentative agreement:

The basic test method for TxD with all the active antennas ON.

* Additional approach with “test mode” can be based on vendors declaration to address the phase mismatch between antennas

**Issue 2-1-1: Loading of Reverberation Chambers for OFDM signal measurements**

* Proposals
  + Proposal 1: For the measurement of OFDM technologies, each lab could load their RC so that the instantaneous channel provided by each mode-stirring sample meets the agreed-upon performance metric (such as peak-to-average power ratio, RMS delay spread or level-crossing rate, which would require further study) corresponding to the 3GPP channel model with the longest delay spread. In this sense, inter-laboratory comparisons could be carried out to study the proposed metric values. (EMITE, NIST)
* Agreement:
  + Companies are encouraged to further study the approach proposed in proposal 1.

**Issue 3-1-1: Measurement Grids for 2Tx simultaneously**

* Proposals
  + Proposal 1: Repeat the same simulation as in R4-2308824 for two antenna transmissions. (Huawei)
  + Proposal 2: Study the need for finer measurement grids for TxD and single-layer UL MIMO TRP testing (including the corresponding increase in test time for multi-TPMI based test methods) (Keysight)
* Discussion:
  + Apple: We have discussed different test metrics for TRP with 2Tx. Does this will impact on measurement grid evaluation?
  + Keysight: For proposal 1, some of assumption may not applicable for measurement grid assumption with 2Tx. For the test metric impact, need more study.
  + R&S: We have more factors for 2Tx , not feasible to direct reuse existing assumption, further study required.
  + Samsung: We believe the analysis on test measurement grid impact with different test metric required.
* Agreement:
  + RAN4 further study the impact on measurement grids for TxD and single-layer UL MIMO TRP testing (including the corresponding increase in test time for multi-TPMI based test methods)

**Issue 4-2-2: Measurement campaign Template for collecting measurement data of Rel-18 measurement campaign to define Rel-18 TRP/TRS requirements**

* Proposals
  + Proposal 1: Update Rel-17 template with adding both browsing mode and talk mode as Rel-18 measurement campaign template. (Moderator)
* Agreement:
  + Proposal 1 agreed

**Issue 4-2-3: Neutral observer to manage UE information collecting and disclosure activity for Rel-18**

* Proposals
  + Proposal 1: It is proposed that RAN4 Secretary will cover the role of the trusted third, neutral party to collect the measurements results provided by the laboratories and forward them to the RAN4 group after anonymizing the sensitive data. (Apple, Telecom Italia)
  + Proposal 2: The Neutral party/RAN4 secretary ONLY publishes to 3GPP RAN4 the summary of statistical information covering the below. (Apple, Telecom Italia)

|  |
| --- |
| ·       ***Total number of devices*** |
| ·       ***Total number of models*** |
| ·       ***Total number of devices vendors*** |
| ·       ***Percentage of devices per vendor*** |
| ·       ***Percentage of devices per Power Class*** |
| ·       ***Percentage of devices per each supported band*** |
| ·       ***Percentage of devices per year of production*** |
| ·     [***Percentage of the devices that are certified by PTCRB and GCF] – Pending volunteer lab feedback*** |
| ·       ***Percentage of devices that are commercially available*** |

**Agreements:**

**RAN4 Secretary will cover the role of the trusted third, neutral party to collect the UE information (without measurement data) provided by the laboratories and forward them to the RAN4 group after anonymizing the sensitive UE information data, e.g. UE model name and others.**

**The Neutral party/RAN4 secretary ONLY publishes to 3GPP RAN4 the summary of statistical information.**

|  |
| --- |
| 1. ·       ***Total number of devices*** |
| 1. ·       ***Total number of models*** |
| 1. ·       ***Total number of devices vendors*** |
| 1. ·       ***Percentage of devices per vendor*** |
| 1. ·       ***Percentage of devices per Power Class*** |
| 1. ·       ***Percentage of devices per each supported band*** |
| 1. ·       ***Percentage of devices per year of production*** |
| 1. ·     [***Percentage of the devices that are certified by at least one of certification bodies as following: PTCRB ,GCF, and NAL\_CTA (Chinese network access licensed test)]*** |
| 1. ·       ***Percentage of devices that are commercially available*** |

* Discussion:
* TIM: We can focus on the list of items, for the threshold we can discuss separately.
* Apple: Do we have some mechanism to ensure only commercial devices collected?
* TIM: We can figure out some way.

**Issue 4-2-3: Actions from volunteer labs**

* Proposals
  + Proposal 1: Volunteer labs should fill out a Device Pool Information sheet separate from the sheet used to submit measurement data from the campaign. (Apple, Telecom Italia)
* Agreement:
  + Proposal 1 agreed

**Issue 4-2-6: Thresholds to be satisfied in order to validate the statistical relevance of the devices pool**

* Proposals
  + Proposal 1: It is proposed to adopt the following thresholds to be satisfied in order to validate the statistical relevance of the devices pool: (Telecom Italia)
    - Total number of devices: >= 40 (this number is in line with Rel-17)
    - Total number of models: >= 30
    - Total number of devices’ vendors: >=5
    - Year of production of the devices: from second-half 2021 to 2023
    - Percentage of the devices that are certified by any of certification bodies as following : PTCRB, GCF, and NAL\_CTA: 100%
    - Percentage of devices that are commercially available: 100%
  + Proposal 2: RAN4 need to discuss how to address the case in which a threshold (or more) will not be satisfied) (Telecom Italia)
  + Proposal 3: Further discussion needed on any setting of thresholds for the provided statistical metrics. (Apple, Telecom Italia)
* Discussion:
  + vivo: Given we just start lab alignment activity, better to give more time for companies to check.
  + TIM: RAN4 need to figure out the way how to check whether the threshold satisfy or not. And also need to decide the procedure how to deal with the case if certain condition not satisfied.

**Issue 4-2-7: Adopting the same UE information collection approach for both Rel-18 TRP/TRS and Rel-18 MIMO OTA**

* Proposals
  + Proposal 1: It is proposed to adopt sections 2.1, 2.2 and 2.3 and the proposals within also for the performance part framework of the MIMO OTA enhancement WI. (Apple, Telecom Italia)
* Discussion:
  + CAICT: We are ok to apply same information to be collected for FR1 MIMO OTA measurement activity. For FR2 MIMO OTA, the situation quite different compared to FR1 TRP TRS.
  + QC: We agree with CAICT, the situation is different in FR1 and FR2, more discussion needed for FR2.
  + Apple: We need to pay attention to avoid the discourse the actual device performance mapping.
* Agreement:
  + The same UE information collection approach from Rel-18 TRP/TRS can be applied for FR1 MIMO OTA
    - The threshold value can be discussed separately
  + FFS for FR2 MIMO OTA

**Issue 4-2-1: updated working procedure for Rel-18 TRP TRS Performance Test Campaign to define requirements**

Update item 4

1. Devices provisioning:
   1. Any 3GPP member can work with test labs to provide devices to the aligned test labs (each test lab shall provide a single measurement result set for repeated UE model into RAN4 measurement campaign data pool)
      1. FFS for the same UE model with supporting different set of bands
   2. Logistical aspects for devices provisioning to the labs are TBD]

**R4-2313891 WF for Rel-18 FR1 TRS TRS**

*Type: other For: Approval  
 Source: vivo*

**Decision: Approved.**

### 8.16 Enhancement of Multiple Input Multiple Output Over-the-Air test methodology and requirements for NR UEs

#### 8.16.1 General and work plan

**R4-2311276 Channel Model Validation Results for FR2 MIMO OTA**

*Type: discussion For: Information  
 Source: ETS-Lindgren Europe*

**Decision: Noted.**

**R4-2312535 On FR2 MIMO OTA lab alignment schedule**

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

**Decision: Noted.**

#### 8.16.2 FR2 MIMO OTA test methodology enhancement

**R4-2312536 FR2 MIMO OTA channel model validation results**

*Type: discussion For: Discussion  
 Source: CAICT*

**Decision: Noted.**

**R4-2312922 On simulation activity of FR2 MIMO OTA**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2313220 Discussion on FR2 power validation passfail limit**

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

**Decision: Noted.**

**R4-2313260 On Test methodology for FR2 Channel Model Power Validation**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0016 rev Cat: F (Rel-18)  
  
 Source: Apple*

**Decision: Revised to R4-2313897 (from R4-2313260).**

**R4-2313897 On Test methodology for FR2 Channel Model Power Validation**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0016 rev Cat: F (Rel-18)  
  
 Source: Apple*

**Decision: Agreed.**

**R4-2313799 FR2 CM Validation Corrections**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0018 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Revised to R4-2313898 (from R4-2313799).**

**R4-2313898 FR2 CM Validation Corrections**

*Type: CR For: Agreement  
 38.151 v17.4.0 CR-0018 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd*

**Decision: Agreed.**

#### 8.16.3 FR1 MIMO OTA test methodology enhancement

**R4-2311059 on test hand phantom in MIMO**

*Type: discussion For: Agreement  
 Source: Huawei Tech.(UK)*

**Decision: Noted.**

**R4-2311064 Power validation results at Low bands**

*Type: discussion For: Discussion  
 38.151 v CR- rev Cat: (Rel-18)  
  
 Source: MediaTek (Hefei) Inc.*

**Decision: Noted.**

**R4-2311754 On FR1 MIMO OTA channel model validation**

*Type: discussion For: Information  
 Source: Apple*

**Decision: Revised to R4-2313896 (from R4-2311754).**

**R4-2313896 On FR1 MIMO OTA channel model validation**

*Type: discussion For: Information  
 Source: Apple*

**Decision: Noted.**

**R4-2312356 CMCC&BUPT joint lab FR1 channel validation results for n1, n5, n8 and n28**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Revised to R4-2313899 (from R4-2312356).**

**R4-2313899 CMCC&BUPT joint lab FR1 channel validation results for n1, n5, n8 and n28**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2312537 On necessity of FR1 MIMO OTA test with hand phantom**

*Type: other For: Approval  
 Source: CAICT*

**Decision: Noted.**

**R4-2312899 Channel model validation results for Band n28**

*Type: other For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2312923 On FR1 MIMO OTA in browsing mode**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2313783 On Phantom Testing and QZ Sizes**

*Type: other For: Approval  
 Source: Keysight Technologies UK Ltd*

**Decision: Noted.**

#### 8.16.4 MU assessment

#### 8.16.5 Performance requirements

**R4-2312510 Discussion on handling of PAD measurement results into data pool**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312538 FR1 MIMO OTA channel model validation results for band n28**

*Type: discussion For: Discussion  
 Source: CAICT*

**Decision: Noted.**

**R4-2312924 On measurement campaign of FR1 MIMO OTA**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

**R4-2312925 FR1 n28 channel model validation**

*Type: other For: Approval  
 Source: OPPO*

**Decision: Noted.**

#### 8.16.6 Moderator summary and conclusions

**[108][331] NR\_MIMO\_OTA\_enh, AI 5.2.5 (except R4-2311231), 8.16**

**R4-2314267 Topic summary for [108][331] NR\_MIMO\_OTA\_enh**

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

**Decision: Noted.**

**R4-2313885 Ad-hoc minutes for NR\_MIMO\_OTA\_enh**

*Type: other For: Approval  
 Source: CAICT*

**Decision: Approved.**

**Issue 1-1-5: Whether/how to down-select the bands for specifying FR1 performance requirements**

* Proposals:
  + Proposal 1: Specify the TRMS requirement for no more than three bands out of the candidate bands, i.e., n1, n5, n8, n28, n77. (OPPO)
  + Others
* Discussion:
  + CTC: If down-selection needed, our prioritized bands is n1 and n5.
  + TIM: We would like to prioritize band n28.
  + Vodafone: band n28.
* Agreement: band n1, n5, n28 will be covered by Rel-18 MIMO OTA.

**Issue 2-1-1: Simulation activities for FR2 MIMO OTA**

* Proposals (OPPO)
  + Proposal 1: The following key issues should be concluded before the simulation platform validation starts.
    - How to obtain the FR2 antenna system radiation patterns
    - Whether and how to consider the difference on the UE baseband capability
    - How much gap between simulation and measurement is allowed
  + Proposal 2: Confirmation from PAD providers is need that whether the antenna system radiation patterns can be provided for simulation platform validation.
  + Proposal 3: If the above key issues in Proposal 1 are not concluded before RAN4 #109 meeting, down-selection can be made that the pure measurement approach is adopted for FR2 measurement campaign.
* Agreements: Down-selection can be made that the pure measurement approach is adopted for FR2 measurement campaign.

**R4-2313900 WF for Rel-18 MIMO OTA**

*Type: other For: Approval  
 Source: CAICT*

**Decision: Approved.**

### 8.17 BS and UE EMC enhancements

#### 8.17.1 General and work plan

#### 8.17.2 BS EMC enhancements

**R4-2312050 Discussion on MSR BS EMC test simplification**

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

**Decision: Noted.**

**R4-2312290 BS EMC enhancements**

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

**Decision: Noted.**

**R4-2312912 Discussion on BS EMC enhancement**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313607 Analysis of the manufacturer declarations implementation in legacy BS EMC specifications**

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

**Decision: Noted.**

**R4-2313612 Further discussion on EMC requirements simplification for MSR BS and AAS BS**

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

**Decision: Noted.**

**R4-2313614 draft CR to TS 37.113: example implementation of the MSR BS testing simplification**

*Type: draftCR For: Endorsement  
 37.113 v17.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2313611 CR to TS 36.113: framework for the EMC-specific manufacturer's declarations, Rel-18**

*Type: CR For: Agreement  
 36.113 v17.1.0 CR-0088 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313913 (from R4-2313611).**

**R4-2313913 CR to TS 36.113: framework for the EMC-specific manufacturer's declarations, Rel-18**

*Type: CR For: Agreement  
 36.113 v17.1.0 CR-0088 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2312913 CR to TS 37.113 Implementation of EMC enhancements**

*Type: CR For: Agreement  
 37.113 v17.2.0 CR-0127 rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Not pursued.**

**R4-2313914 draft CR to TS 37.113 Implementation of EMC enhancements**

*Type: draft CR For: Endorsement  
 37.113 v17.2.0 CR-rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Discussion:**

**Decision: Postponed.**

**R4-2313608 CR to TS 37.113: framework for the EMC-specific manufacturer's declarations, Rel-18**

*Type: CR For: Agreement  
 37.113 v17.2.0 CR-0128 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2313610 CR to TS 38.113: framework for the EMC-specific manufacturer's declarations, Rel-18**

*Type: CR For: Agreement  
 38.113 v17.4.0 CR-0064 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313995 (from R4-2313610).**

**R4-2313995 CR to TS 38.113: framework for the EMC-specific manufacturer's declarations, Rel-18**

*Type: CR For: Agreement  
 38.113 v17.4.0 CR-0064 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2313615 draft CR to TS 37.114: example implementation of the AAS BS testing simplification**

*Type: draftCR For: Endorsement  
 37.114 v17.1.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313915 (from R4-2313615).**

**R4-2313915 draft CR to TS 37.114: example implementation of the AAS BS testing simplification**

*Type: draftCR For: Endorsement  
 37.114 v17.1.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2313609 CR to TS 37.114: framework for the EMC-specific manufacturer's declarations, Rel-18**

*Type: CR For: Agreement  
 37.114 v17.1.0 CR-0107 rev Cat: F (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

#### 8.17.3 UE EMC enhancements

**R4-2312900 draft CR to 38.124 R18 UE EMC**

*Type: draftCR For: Endorsement  
 38.124 v17.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Xiaomi*

**Decision: Revised to R4-2313916 (from R4-2312900).**

**R4-2313916 draft CR to 38.124 R18 UE EMC**

*Type: draftCR For: Endorsement  
 38.124 v17.2.0 CR- rev Cat: B (Rel-18)  
  
 Source: Xiaomi*

**Decision: Endorsed.**

**R4-2313613 Further discussion on EMC requirements simplification for NR UE**

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

**Decision: Noted.**

#### 8.17.4 Moderator summary and conclusions

**[108][305] NR\_LTE\_EMC\_enh, AI 4.3, 8.17**

**R4-2314241 Topic summary for [108][305] NR\_LTE\_EMC\_enh**

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

**Decision: Noted.**

**Issue 2-1-1: We have two proposals, see latest WF in R4-2309861**

*o Option 1: Reduce RATs within each band.*

*o Option 2: Reduce number of bands tested.*

* **Proposals:**
  + **Proposal 1**: Reduce the RATs per band, and consider each band independently, as the first step of test simplification for multi-band MSR.
  + **Proposal 2:** Test reduction for the multi-band operation is realized band-by-band, by utilizing the RAT reductions based on manufacturer declaration, as shown in the proposed Table 2 in R4-2313612
* Agreement: Option 1 agreed

**Sub-topic 2-2: Manufacturer declarations framework**

**Issue 2-2-1: New table with EMC-specific manufacturer declarations for MSR BS test requirements**

* **Proposals:**
  + Proposal 1: introduce a table capturing EMC-specific manufacturer declarations in TS 37.113 and TS 37.114, including their descriptions, individual IDs
  + Proposal 2: introduce a table capturing EMC-specific manufacturer declarations in TS 36.113 and TS 38.113 (under TEI WI code), in order to keep consistency among BS specifications.
* Agreement: Proposal 1 agreed

**Topic #3 UE EMC**

**Issue 1**: For other emission test and other immunity test besides radiated emission and radiated immunity (i.e. RF electromagnetic field, Electrostatic discharge):

* + Option 1: one example combination of CA and DC is selected for each frequency range (i.e. FR1 only, FR1+FR2, FR2 only) if supported.
  + Option 2: only one example combination of CA and DC is selected for all the supported band combination.
* Agreement: Option 1 agreed

**R4-2313912 WF for BS EMC**

*Type: other For: Approval  
 Source: Ericsson*

**Discussion:**

**Decision: Approved.**

### 8.18 NR demodulation performance evolution

#### 8.18.1 Advanced receiver to cancel inter-user interference for MU-MIMO

##### 8.18.1.1 Receiver assumption and NWA signaling

**R4-2311094 Discussion on the receiver assumption and signaling aspects for the advanced receiver for MU-MIMO**

*Type: discussion For: Discussion  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311352 On advanced receiver to cancel intra-user interference for MU-MIMO**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2311512 Discussion on Receiver assumption and NWA signaling for MU-MIMO**

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

**Decision: Noted.**

**R4-2311737 On Advanced Receivers - Receiver assumption and NWA signaling**

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

**Decision: Noted.**

**R4-2311738 Advanced Receivers - Simulation results for receiver assumption study**

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

**Decision: Noted.**

**R4-2311776 MU-MIMO advanced receiver discussion**

*Type: discussion For: Approval  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2311998 Discussion on MIMO-IC on MU-MIMO**

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

**Decision: Noted.**

**R4-2312354 discussion on advanced receiver assumption and NWA signaling for MU-MIMO**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2312546 On required information for MU-MIMO interference cancellation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313267 Receiver assumption and Network signalling for advanced receiver for MU-MIMO**

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

**Decision: Noted.**

**R4-2313270 Draft LS on required RRC signalling for advanced receiver on MU-MIMO scenario**

*Type: LS out For: Approval  
 to RAN2  
 Source: Huawei,HiSilicon*

**Decision: Noted.**

**R4-2313734 LS on UE capability and network assistant signalling for advanced receivers**

*Type: LS out For: Approval  
 to RAN2, cc RAN1  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

##### 8.18.1.2 Test parameters and simulation results

**R4-2311095 Discussion on the test parameters for the advanced receiver for MU-MIMO**

*Type: discussion For: Discussion  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311096 Phase I simulation results for the advanced receiver for MU-MIMO**

*Type: discussion For: Information  
 Source: China Telecom*

**Decision: Revised to R4-2313945 (from R4-2311096).**

**R4-2313945 Phase I simulation results for the advanced receiver for MU-MIMO**

*Type: discussion For: Information  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311098 Simulation result collection for advanced receiver for MU-MIMO**

*Type: discussion For: Information  
 Source: China Telecom*

**Decision: Noted.**

**R4-2311739 On Advanced Receivers - Test parameters**

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

**Decision: Noted.**

**R4-2311740 Advanced Receivers - Simulation results**

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

**Decision: Noted.**

**R4-2311353 On test parameters and simulation results for MU-MIMO**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2311513 Test parameters and simulation results for MU-MIMO**

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

**Decision: Noted.**

**R4-2311999 Simulation results of MIMO-IC on MU-MIMO**

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

**Decision: Noted.**

**R4-2312547 Simulation results for MU-MIMO interference cancellation**

*Type: other For: Information  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313268 Test parameters and simulation results for advanced receiver for MU-MIMO**

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

**Decision: Noted.**

**R4-2313704 Simulation results of MU-MIMO R-ML receiver**

*Type: discussion For: Discussion  
 Source: Spreadtrum Communications*

**Decision: Noted.**

**R4-2311097 TP to TR38.878: on the phase I conclusion for advanced receiver for MU-MIMO**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: China Telecom*

**Decision: Revised to R4-2313969 (from R4-2311097).**

**R4-2313969 TP to TR38.878: on the phase I conclusion for advanced receiver for MU-MIMO**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: China Telecom*

**Decision: Endorsed.**

**R4-2311099 TP to TR38.878: Symbols and abbreviations**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: China Telecom*

**Decision: Revised to R4-2313970 (from R4-2311099).**

**R4-2313970 TP to TR38.878: Symbols and abbreviations**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: China Telecom*

**Decision: Endorsed.**

**R4-2311100 Draft TR 38.878 v0.1.0 : NR demodulation performance evolution**

*Type: draft TR For: Agreement  
 38.878 v0.1.0 CR- rev Cat: (Rel-18)  
  
 Source: China Telecom*

**Decision: Email approval**

**R4-2311514 TP for TR 38.878 Receiver structure of MU-MIMO**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2313971 (from R4-2311514).**

**R4-2313971 TP for TR 38.878 Receiver structure of MU-MIMO**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2313994 (from R4-2313971).**

**R4-2313994 TP for TR 38.878 Receiver structure of MU-MIMO**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: ZTE Corporation*

**Decision: Endorsed.**

**R4-2311741 TP for TR38.878: Summary of link level evaluation**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2313972 (from R4-2311741).**

**R4-2313972 TP for TR38.878: Summary of link level evaluation**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2311777 MU-MIMO TR TP**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2313973 (from R4-2311777).**

**R4-2313973 MU-MIMO TR TP**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

**R4-2312000 TP to TR38.878 on Scenario and interference modelling**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2313974 (from R4-2312000).**

**R4-2313974 TP to TR38.878 on Scenario and interference modelling**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: MediaTek inc.*

**Decision: Endorsed.**

**R4-2312548 TP to TR38.878: Link level simulation results**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Revised to R4-2313975 (from R4-2312548).**

**R4-2313975 TP to TR38.878: Link level simulation results**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

*Nokia: There are some editorial typos which need to be addressed when merged all endorsed TPs to draft TR.*

**Decision: Endorsed.**

**R4-2313269 Draft TP on TR 38.878 Introduction on parameters for link level evaluation**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Huawei,HiSilicon*

**Decision: Revised to R4-2313976 (from R4-2313269).**

**R4-2313976 Draft TP on TR 38.878 Introduction on parameters for link level evaluation**

*Type: pCR For: Approval  
 38.878 v0.0.1 CR- rev Cat: (Rel-18)  
  
 Source: Huawei,HiSilicon*

**Decision: Endorsed.**

#### 8.18.2 Absolute physical layer throughput requirements with link adaptation

**R4-2311354 Summary of simulation results for physical layer throughput requirements**

*Type: other For: Information  
 Source: Apple*

**Decision: Withdrawn.**

**R4-2311742 CR for 38.101-4: ATP requirements for FR2.1**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0392 rev Cat: F (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged (with R4-231xxxx).**

**R4-2312349 [NR\_demod\_enh3-Perf] correction CR 38.101-4 on PDSCH absolute physical layer throughput requirements**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0401 rev Cat: F (Rel-18)  
  
 Source: Samsung*

**Discussion:**

Apple: “CodebookSubsetRestriction” cannot be “not configured”.

QC: For measurement channel, we need to align the format for both tables.

Ericsson: We enable rank adaption for ATP test, both TBS needed.

**Decision: Revised to R4-2313849 (from R4-2312349).**

**R4-2313849 [NR\_demod\_enh3-Perf] correction CR 38.101-4 on PDSCH absolute physical layer throughput requirements**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0401 rev Cat: F (Rel-18)  
  
 Source: Samsung, Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, Cybercore*

**Decision: Agreed.**

**R4-2313274 CR on 38.101-4: Correction on test parameters for ATP test**

*Type: CR For: Agreement  
 38.101-4 v18.0.0 CR-0409 rev Cat: F (Rel-18)  
  
 Source: Huawei,HiSilicon*

**Decision: Merged (with R4-231xxxx).**

#### 8.18.3 Moderator summary and conclusions

**[108][326] NR\_demod\_enh3\_Part1, AI 8.18.1**

**R4-2314262 Topic summary for [108][326] NR\_demod\_enh3\_Part1**

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

**Decision: Noted.**

**Issue 1-1-1: Selection of reference receiver**

Proposals:

* + Option 1: Down select to R-ML as the reference receiver (China Telecom, ZTE, MTK, Apple if assistant DCI signalling can be introduced)
  + Option 2: Keep the decision open (Nokia, Huawei)
    - HW: Make the decision on August meeting based on RAN1’s agreements.
  + Option 3: Down select to R-ML if requirements for only one advanced receiver is defined. Do not down-select if we consider to define two sets of requirements in phase II (Samsung)
* Discussion:
  + CTC: Based on our simulation results, R\_ML show more performance gain. We also aware RAN1 discussion still ongoing on the introduction of DCI signaling.
  + QC: We agree with China Telecom based on simulation results. There are some cases which R-ML receiver not applicable.
  + Samsung: The maybe pending on performance requirement’s introduction.
  + Huawei: If DCI signaling can be introduced, then we are fine to down-select as R-ML receiver. The applicable test cases shall be further discussed for performance requirement’s introduction phase.
  + MTK: We share similar view as Huawei.
  + Nokia: We also agree R-ML most likely can be selected meanwhile we are stilling evaluating the performance with several cases.
  + Apple: Based on the collected results so far, E-IRC not suitable. R\_ML shall be choosed, the detailed test set-up need to further discussed and pending on the conclusion for the DCI signaling introduction.
* Agreement: Down select to R-ML as the reference receiver.
  + - The above decision can be revisited in case DCI-based assistant signalling cannot be introduced in RAN1.
    - Detailed test set-up for R-ML receiver will be further discussed and decided during performance requirements introduction phase.
    - FFS whether test cases need to be introduced for cases which R-ML receiver not applicable

**Issue 1-1-2: Additional assumptions to the R-ML receiver**

* Proposals:
  + Option 1: R-ML receiver for maximum 4 layers across target and co-UE, with DMRS configuration type 1 with length 1 (Apple, ZTE, Nokia, MTK)
    - Samsung: RAN1 has decided to increase DMRS ports in Rel.18 and introduce new parameter enhanced-dmrs-Type\_r18, RAN4 should clarify whether the enhanced DMRS type introduced in Rel.18 should be considered.
  + Option 2: Not to have additional assumptions to the R-ML receiver (China Telecom, Samsung)
    - CTC: If there is a need to limit the R-ML processing complexity, use similar approach as R-ML for SU-MIMO, i.e., on each RE, the R-ML for at most X streams, where X is the total number of the target and co-scheduled layer, and X ≤ UE Rx number.
* Discussion:
  + QC: We have default assumption in previous discussion. Meanwhile no additional assumption to R-ML receiver needed. We can introduce test set-up following option 1.
  + Huawei: We need to consider both RAN4 test set-up and the assumption/restriction for DCI signaling introduction. For RAN4 test set-up, we are fine following the assumption with option 1. For RAN1 assumption, we need more discussion.
  + CTC: We believe this applicable for both RAN4 requirements and RAN1 signaling from feature design itself.
  + MTK: DMRS pattern has impact on UE implementation of BD complexity. RRC signaling can be considered to reduce the BD complexity.
  + Apple: We need to clarify the applicable scenarios with R-ML receiver. UE processing complexity need to be carefully considered.
  + Samsung: We can understand option 1 can help to reduce UE complexity, meanwhile we need to consider signaling design and NW schedule flexibility.
  + Ericsson: We need to clarify does this for test configuration or this intended for feature introduction; or for both? We prefer not to limit the scenarios.
* Agreement:
  + From RAN4 requirements test set-up perspective, introducing test cases with maximum 4 layers across target and co-UE, with DMRS configuration type 1 with length 1
  + From R-ML receiver feature introduction perspective (e.g., applicable scenarios/assumption for signaling introduction):
    - FFS any restriction needs or not including DMRS pattern, and maximum number of layers need to handle with R-ML receiver

**Issue 1-2-1-1: The DMRS port information for the co-scheduled UE**

* Proposals on additional RRC based assistant signalling:
  + Option 1: No need to consider additional RRC signaling for DMRS port (ZTE, China Telecom, MTK, Ericsson, Huawei, Nokia in case maximum 4 layers is assumed to be handled)
  + Option 2: Introduce the assistant RRC signalling such as upper bound on number of ports of co-scheduled UEs to be detected (Samsung)
    - Spreadtrum: Observations from the simulation results
* The higher SNR point is more sensitive to the DMRS port detection error, it’s observed that DMRS port detection error leads to higher performance loss in the higher SNR case, e.g test number 5 shows 2.1dB loss due to FDRA and DMRS port blind detection error, while the corresponding loss in test number 4 is 0.3dB, while noting the two test cases show the highest difference of SNRs.
* Discussion
  + - Samsung: We think introducing RRC assistant signalling can help to reduce UE BD complexity.
    - MTK: We suggest to discuss further together with previous issue.
    - CTC: It’s not realistic for introducing RRC signalling for DMRS ports as this can be updated dynamic per slot.
    - Apple: We have same view as MTK.

**Issue 1-2-1-5: Frequency domain resource allocation type for the co-UE and the target UE**

* Discussion:
  + - QC: FDRA better to be addressed by DCI instead of RRC signalling.
    - Huawei: We think it’s not feasible with RRC signalling.
    - CTC: We don’t support option 1. This will restrict NW configuration and R-ML applicable scenarios.
    - Nokia: Our simulation results show the possibility with BD with limited performance loss. We also agree with CTC, this will restrict the NW and applicable scenarios.
    - ZTE: We have similar view as CTC and Nokia based on our results.
    - Apple: We are proposing whether the frequency allocation type across MU-MIMO co-scheduled UE is same or not.
    - QC: As well as we have default assumption for PRG grid alignment.

**Issue 1-2-2-2: The modulation order information of the co-scheduled UE (DCI based assistant signaling)** Proposals on wording updates to the previous approved LS to RAN1:

* + Proposal 1: (Qualcomm)
    - For indexes 1-5, In all the PRGs allocated to the target UE **have co-scheduled UE(s)**, which has the same DMRS sequence as the target UE, scheduled with QPSK/16QAM/… **transmission**.
    - For indexes 1-6, revise ‘PRB’ to ‘PRG’
* Proposals on alternative DCI signalling:
  + Technical concern from Qualcomm:
    - The network MU-MIMO scheduling scheme may punish the blind modulation order detection capable UE by
* Allocating the resources with aligned modulation order to the UEs without blind modulation capability and allocating the resources with misaligned modulation order to UEs with blind modulation detection capability.
  + - Then UE with blind modulation order detection capability may have worse performance
  + Option 1: 1 bit signaling without modulation order information (Qualcomm)

|  |  |
| --- | --- |
| Bit field mapped to index | Content |
| 0 | No co-scheduled UE(s) which has same DMRS sequence as target UE exists |
| 1 | Others |

* + Option 2: 2-bit signaling in which all the cases require blind modulation order detection but with different levels of complexity (Qualcomm)

|  |  |
| --- | --- |
| Bit field mapped to index | Content |
| 00 | No co-scheduled UE(s) which has same DMRS sequence as target UE exists |
| 01 | In all the PRGs allocated to the target UE, all the co-scheduled UEs, which has the same DMRS sequence as the target UE, have the same modulation order. |
| 10 | In each individual PRG allocated to the target UE, the following condition is satisfied:  Only single modulation order is allocated for the co-scheduled UE(s) which has the same DMRS sequence as the target UE, if the co-scheduled UE(s) exist |
| 11 | Others |

* Proposals in case DCI based NWA is not agreed in RAN1:
  + Option 1: RAN4 should further discuss possibility of indicating modulation order NWA via MAC-CE (Apple)
  + Option 2: E-MMSE-IRC will be selected (Huawei)
* Discussion:
  + QC: We agreed introducing DCI signaling from UE flexibility perspective, one missing point not consider is echo system impact. Following DCI signaling, pending UE capability whether support BD of modulation orders, NW can provide assistant signaling accordingly. With above assumption, advanced UE receiver may show worse performance compared to UE which not supported BD on modulation orders due to the performance loss introduced by BD. We suggest to consider one UE type with BD on modulation orders.
  + CTC: We prefer to respect previous agreement to consider different UE capability with and w/o BD on modulation orders. We think current agreement don’t have impact on NW deployment/scheduling.
  + Apple: We already discussed this candidate option in previous meeting together with other options. We agreed to introduce different UE assumption with and w/o BD on modulation orders, and we prefer to respect the agreements. For QC concern, we believe NW vendors can provide some feedback.
  + Nokia: From NW perspective, we don’t intend to discriminate different UEs. New proposed DCI will make discrimination impossible. To conclude, we are not against to discuss this new DCI signaling option.
  + Ericsson: We agree the comments with Nokia. We understand the concern from QC, BD can bring performance loss. From NW perspective, we can’t guarantee always schedule same modulation orders. From NW side, we can consider to inform such information by DCI signaling if workable.
  + Samsung: From timeline perspective, LS already sent to RAN1. It’s beneficial to indicate modulation orders to UE; meanwhile allow UE flexibility still be helpful for NW.
  + MTK: We support previous agreements and this option already be discussed in previous meeting.
  + Huawei: We can understand the concern from QC. From NW scheduling perspective, many factors need to be considered; the whole system performance shall be considered from NW side. It’s unlikely NW introduce different scheduling for different UEs and NW not intend to discriminate different UEs.

**Issue 1-2-2-4: Additional evaluation on modulation order blind detection**

* Proposals:
  + Option 1: RAN4 to analyse 2 co-UE with different MO and FDRA with ZP-CSI-RS aided blind detection (Nokia)
    - Nokia’s proposal on the exact evaluation assumption and ZP CSI-RS configuration:
* Agreement:
  + Interested companies can further evaluate the performance impact with ZP-CSI-RS aided blind detection under phase II performance requirements introduction phase.

**Issue 1-3-1: Capability signalling for advanced receiver for MU-MIMO (If introduced)** Proposals on whether to consider UE capability signalling for Rel-18 advanced receiver for MU-MIMO:

* + Option 1: Introduce optional UE capability signaling on MU-MIMO advanced receiver (China Telecom, Apple, Nokia, MTK, Samsung)
* Proposals on UE capability signalling details:
  + On indication if a UE supports modulation order blind detection or not
    - Option 1: UE capability signaling to indicate if a UE supports modulation order blind detection or not (Nokia, Samsung, Ericsson, Apple, MTK)
* MTK: introduce 3 level UE capabilities for MIMO advanced receiver, i.e., R-ML without blind detection (bit-fields 0-5), R-ML with low complexity blind detection (bit-fields 0-6), R-ML with blind detection (bit-fields 0-7)
  + - Option 2: Define optional features based on UE’s declaration without capability signaling for UE with and without modulation order blind detection (Huawei)
    - China Telecom: RAN4 needs to discuss whether it is beneficial for the network to know the exact R-ML implementation, i.e., with or without modulation order blind detection.
  + On indication of UE maximum supported layers and modulation order:
    - Option 1: (Apple)
* Maximum number of layers of co-UE or total number of layers for joint detection
* UE capability on maximum number of DMRS ports for blind detection
  + - Option 2: (Ericsson)
* Maximum modulation orders of interfering DMRS ports supported.
* Maximum number of interfering DMRS ports supported, which is derived by subtracting the scheduled MIMO layers for the target UE from *maxNumberMIMO-LayersPDSCH*
* Discussion:
  + QC: We need to further discuss the granularity and signaling type for this optional feature.
  + QC: Whether separate UE capability with and W/O BD on modulation order can be pending on conclusion on DCI signaling. We believe no need to have separate capability signaling for BD, but we can have optional with declaration basis without information to NW for BD capability.
  + Apple: Do we need to introduce separate test cases if option 1 adopted?
  + QC: We can further discuss test cases.
  + MTK: We prefer to consider separate capability for UE with and W/O BD.
  + Samsung: We prefer option 2 as MTK mentioned.
  + Huawei: We don’t pose much restriction on NW side; we think option 1 enough.
* Agreement:
* Supporting MU-MIMO advanced receiver is an optional feature with capability signaling
* The granularity and signaling type for this feature:
  + Option 1: Introduce signaling for whether supporting R-ML receiver under MU-MIMO
    - With or W/O BD on modulation orders can be declaration basis without information to NW
  + Option 2: Introduce separate capability for R-ML receiver with and w/o BD on modulation orders capability

**R4-2313850 Ad-hoc minutes for Performance evolution WI**

*Type: other For: Approval  
 Source: China Telecom*

**Decision: Approved.**

**R4-2313874 WF for Advanced receiver to cancel inter-user interference for MU-MIMO**

*Type: other For: Approval  
 Source: China Telecomm*

**Decision: Revised to R4-2313993 (from R4-2313874).**

**R4-2313993 WF for Advanced receiver to cancel inter-user interference for MU-MIMO**

*Type: other For: Approval  
 Source: China Telecomm*

**Discussion:**

QC: We checked with our RAN1 colleagues; they still have questions on DCI-bit signalling. We think keep it open to further discuss. Our proposal not captured in the WF.

**Decision: Approved.**

**[108][327] NR\_demod\_enh3\_Part2, AI 8.18.2**

**R4-2314263 Topic summary for [108][327] NR\_demod\_enh3\_Part2**

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

**Decision: Noted.**

### 8.19 Study on evolution of NR duplex operation

#### 8.19.1 General and work plan

**R4-2311554 Differences in RAN1 and RAN4 assumptions for SBFD simulations**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Spark NZ Ltd, Nokia, Nokia Shanghai Bell, Ericsson, CableLabs, Charter*

**Decision: Revised to R4-2313978 (from R4-2311554).**

**R4-2313978 Differences in RAN1 and RAN4 assumptions for SBFD simulations**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Spark NZ Ltd, Nokia, Nokia Shanghai Bell, Ericsson, CableLabs, Charter*

**Discussion:**

Samsung: We have offline discussion with proponent companies, we still didn’t get consensus for the necessity on this.

QC: We would like to have more time offline on the assumption on Ericsson TP and come back to this in next meeting.

Huawei: This was discussed several times. It’s better to have clear contents instead of only title generating new section. We also see another proposal with analysis under each parameter instead of new dedicated sub-section. We suggest to come back in future for further discussion.

Charter: We discussed offline with other companies which one possible alternative to capture into Ericsson TP with some information.

ZTE: We also think more discussion needed. RAN1 and RAN4 do evaluation as business as usual.

Ericsson: We do observe the difference assumption among RAN1 and RAN4. We can consider to capture into RAN4 sub-section.

**Decision: Noted.**

**R4-2311809 Draft TR 38.858**

*Type: other For: Approval  
 Source: CMCC*

Samsung: I assume after this meeting, the individual TPs will be endorsed and merged into big TP. This big TP for email endorsement or email approval?

**Decision:** For email endorsement

#### 8.19.2 Study the feasibility of and impact on RF requirements

##### 8.19.2.1 Adjacent channel co-existence evaluation

**R4-2311640 SBFD adjacent channel co-existence simulation results**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2311817 Discussion on residual simulation parameters**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2311818 Simulation results of SBFD**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2312278 Results of SBFD adjacent channel co-ex study**

*Type: discussion For: Discussion  
 Source: Samsung*

**Abstract:**

Submit simulation results of SBFD co-ex study.

**Decision: Noted.**

**R4-2312279 Discussions on SBFD adjacent channel co-ex study**

*Type: other For: Approval  
 Source: Samsung*

**Abstract:**

Discuss the observations from submitted results.

**Decision: Noted.**

**R4-2312289 Discussion on assumptions and simulation results for SBFD coexistence evaluation**

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

**Decision: Revised to R4-2313847 (from R4-2312289).**

**R4-2313847 Discussion on assumptions and simulation results for SBFD coexistence evaluation**

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

**Decision: Noted.**

**R4-2312308 Solutions for inter-operator adjacent co-existence**

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

**Decision: Noted.**

**R4-2312376 Additional simulation results related to SBFD adjacent channel coexistence evaluation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

At the last RAN4 meeting (RAN4#107 in Incheon) simulation results from several companies were collected in the moderator summary [1]. The majority of submitted results was produced for Scenario 1, 6 and Case 1, 3. In addition [2] we also presented results

**Decision: Noted.**

**R4-2312378 Further considerations on SBFD coexistence evaluation simulation assumptions**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this contribution we elaborate around some of the agreed assumption and corresponding implications on the simulation results. In this contribution we have identified some relevant observations and we present some proposals to progress the work.

**Decision: Noted.**

**R4-2313096 On the co-existence study for NR duplex operation**

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

**Decision: Noted.**

**R4-2313169 Simulation results for full duplex coexistence in adjacent channel scenario**

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

**Decision: Noted.**

**R4-2313216 SBFD coexistence simulation results**

*Type: other For: Approval  
 Source: Qualcomm CDMA Technologies*

**Decision: Noted.**

**R4-2313631 NR duplex evolution adjacent-channel coexistence simulation results**

*Type: discussion For: Discussion  
 Source: CableLabs*

**Decision: Withdrawn.**

**R4-2313817 NR duplex evolution adjacent-channel coexistence simulation results**

*Type: discussion For: Approval  
 38.858 v CR- rev Cat: (Rel-18)  
  
 Source: CableLabs, Charter Communications*

**Decision: Noted.**

**R4-2312277 Draft TP to TR 38.858 on Chapter 11**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Samsung*

**Decision: Noted.**

**R4-2312377 TP to TR 38.858: Addition of coexistence simulation assumptions to Annex E**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Revised to R4-2313911 (from R4-2312377).**

**R4-2313911 TP to TR 38.858: Addition of coexistence simulation assumptions to Annex E**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Endorsed.**

##### 8.19.2.2 Implementation feasibility of SBFD

**R4-2313012 TP to TR 38.858: Section 10.1 Background for analysis**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Revised to R4-2313980 (from R4-2313012).**

**R4-2313980 TP to TR 38.858: Section 10.1 Background for analysis**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

*Session chair: Big TP editor will remove “deleted contents part” into big TP.*

**Decision: Endorsed.**

###### 8.19.2.2.1 Feasibility of FR1 BS aspects

**R4-2313170 Further discussion on full duplex from FR1 BS perspective**

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

**Decision: Noted.**

**R4-2313536 SBFD Implementation feasibility on FR1 WA BS aspects**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2311637 TP for TR 38.858 Feasibility of FR1 Local Area BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: CATT*

**Decision: Revised to R4-2313981 (from R4-2311637).**

**R4-2313981 TP for TR 38.858 Feasibility of FR1 Local Area BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: CATT*

**Decision: Revised to R4-2313991 (from R4-2313981).**

**R4-2313991 TP for TR 38.858 Feasibility of FR1 Local Area BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2311638 TP for TR 38.858 Feasibility of FR1 Wide Area BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: CATT*

**Decision: Merged (with R4-231xxxx).**

**R4-2312288 TP to TR 38.858: Feasibility of FR1 BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

*Samsung: This one need to revise to capture medium range aspect.*

**Decision: Revised to R4-2313982 (from R4-2312288).**

**R4-2313982 TP to TR 38.858 section 9.3: Feasibility of FR1 MR BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2312309 TP to TR 38.858: Self-interference analysis for FR1 Wide Area BS**

*Type: pCR For: Approval  
 38.858 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged (with R4-231xxxx).**

**R4-2312310 TP to TR 38.858: Co-site inter-sector interference analysis for FR1 Wide Area BS**

*Type: pCR For: Approval  
 38.858 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged (with R4-231xxxx).**

**R4-2313013 TP to TR 38.858 section 10.2 Feasibility of FR1 BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313214 TP to TR 38.858: Feasibility of FR1 wide area BS aspects**

*Type: pCR For: Approval  
 38.858 v0.1.0 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm CDMA Technologies*

**Decision: Merged (with R4-231xxxx).**

**R4-2313537 TP to TR 38.858 on SBFD Implementation feasibility for FR1 BS**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Samsung*

**Decision: Revised to R4-2313983 (from R4-2313537).**

**R4-2313983 TP to TR 38.858 on SBFD Implementation feasibility for FR1 BS**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Samsung*

**Decision: Endorsed.**

###### 8.19.2.2.2 Feasibility of FR2 BS aspects

**R4-2312311 TP to TR 38.858: Self-interference analysis for FR2 BS**

*Type: pCR For: Approval  
 38.858 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2313984 (from R4-2312311).**

**R4-2313984 TP to TR 38.858: Self-interference analysis for FR2 BS**

*Type: pCR For: Approval  
 38.858 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2312312 TP to TR 38.858: Co-site inter-sector interference analysis for FR2 BS**

*Type: pCR For: Approval  
 38.858 v0.2.0 CR- rev Cat: (Rel-18)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged (with R4-231xxxx).**

**R4-2313014 TP to TR 38.858 section 10.4 Feasibility of FR2 BS aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Merged (with R4-231xxxx).**

**R4-2313215 TP to TR 38.858: Feasibility of FR2 wide area BS aspects**

*Type: pCR For: Approval  
 38.858 v0.1.0 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm CDMA Technologies*

**Decision: Merged (with R4-231xxxx).**

**R4-2313538 TP to TR 38.858 on SBFD Implementation feasibility for FR2 BS**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Samsung*

**Decision: Merged (with R4-231xxxx).**

###### 8.19.2.2.3 Feasibility of FR1 UE aspects

**R4-2311555 TP to TR 38.858: Feasibility of FR1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged (with R4-231xxxx).**

**R4-2312581 TP on UE aspects for FR1 in Full Duplex operation**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: vivo*

**Decision: Merged (with R4-231xxxx).**

**R4-2312908 TP to TR 38.858 on Feasibility of FR1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Merged (with R4-231xxxx).**

**R4-2313422 TP to TR 38.858 on Feasibility of FR1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: MediaTek (Shenzhen) Inc.*

**Decision: Revised to R4-2313869 (from R4-2313422).**

**R4-2313869 TP to TR 38.858 on Feasibility of FR1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: MediaTek (Shenzhen) Inc., Ericsson, vivo, Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

###### 8.19.2.2.4 Feasibility of FR2 UE aspects

**R4-2311556 TP to TR 38.858: Feasibility of FR2 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged (with R4-231xxxx).**

**R4-2312582 TP on UE aspects for FR2-1 in Full Duplex operation**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: vivo*

**Decision: Merged (with R4-231xxxx).**

**R4-2312909 TP to TR 38.858 on Feasibility of FR2-1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Merged (with R4-231xxxx).**

**R4-2313870 TP to TR 38.858 on Feasibility of FR2-1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm, Ericsson, vivo, Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2313990 (from R4-2313870).**

**R4-2313990 TP to TR 38.858 on Feasibility of FR2-1 UE aspects**

*Type: pCR For: Approval  
 38.858 v0.4.0 CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm, Ericsson, vivo, Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

##### 8.19.2.3 Impacts on BS RF requirements

**R4-2311639 Discussion on BS RF requirements impact for SBFD**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2311815 Discussion on SBFD BS RF requirement**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2312287 Discussion on BS RF requirements for SBFD**

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

**Decision: Noted.**

**R4-2312313 RF requirements for SBFD operation**

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

**Decision: Noted.**

**R4-2313011 SBFD BS requirements discussion**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313171 Discussion on BS RF requirement impacts from SBFD perspective**

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

**Decision: Noted.**

**R4-2313539 Impact on BS RF requirements: Further Analysis and TP to TR 38.858**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Samsung*

**Decision: Noted.**

##### 8.19.2.4 Impacts on UE RF requirements

**R4-2311341 On SBFD-aware UE**

*Type: discussion For: Approval  
 Source: Apple*

**Decision: Noted.**

**R4-2312907 Discussion on SBFD UE RF impact**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

#### 8.19.3 Summary of regulatory aspects

**R4-2311808 Discussion on regulatory requirements in China**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2313807 Discussion on adding references in SBFD TR 38.858 Regulatory Aspects**

*Type: discussion For: Discussion  
 Source: CableLabs*

**Decision: Noted.**

**R4-2313540 Further discussion on regulatory aspects of SBFD deployment**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2313256 Sub-Band Full Duplex - TP to TR on Regulatory aspects - summary**

*Type: pCR For: Approval  
 38.858 v0.4.1 CR- rev Cat: (Rel-18)  
  
 Source: Ericsson*

**Decision: Postponed.**

**R4-2313576 Draft TP on Summary of NR duplex evolution regulatory aspects**

*Type: discussion For: Discussion  
 Source: CableLabs*

**Decision: Noted.**

#### 8.19.4 Moderator summary and conclusions

**[108][306] FS\_NR\_duplex\_evo\_Part1, AI 8.19.1, 8.19.2.2.1, 8.19.2.2.2, 8.19.2.3, 8.19.3**

**R4-2314242Topic summary for [108][306] FS\_NR\_duplex\_evo\_Part1**

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

**Decision: Noted.**

**Issue 1-1-1: Differences in RAN1 and RAN4 assumptions for SBFD simulations**

* Proposals/Observations from R4-2311554:
  + Observation 1. It is a common understanding that RAN1 and RAN4 have some differences in simulation assumptions for SBFD.
  + Proposal 1. To include a new section as Annex E for comparison of RAN1 and RAN4 simulation methodology, assumptions, and potential impacts on the results and conclusions as proposed below.
* Discussion:
  + Samsung: In the beginning of this SI, we already have agreement that RAN4 will have simulation assumption following RAN4 methodology. Not sure what’s the purpose and motivation on this. We didn’t see the necessity on this.
  + CMCC: We share similar view as Samsung, both RAN1 and RAN4 simulation assumption already captured in the TR. We didn’t see the needs on this.
  + ZTE: This is as business as usual, RAN4 and RAN1 follow their methodology to do the work. Nothing specific for this SI, we didn’t see any special treatment needed on this SI.
  + QC: We share similar view as previous companies. It’s not acceptable to revisit previous agreements; RAN1 and RAN4 have different objectives and different methodology.
  + Nokia: We are not plan to challenge the simulation assumption agreed in RAN4 and RAN1; we want to clarify the difference among RAN1 and RAN4 group. RAN4 can make conclusions based agreed simulation assumption as it is. This is for information purpose.
  + Cablelabs: We agree with Nokia, we don’t want to challenge RAN1 and RAN4 agreed simulation assumption; we just want to clarify the difference.
  + Charter: We agree with Nokia and Cablelabs, this is no information purpose.
  + Ericsson: We agree with Nokia and Charter/Cablelabs.
  + Huawei: We share similar view a CMCC/Samsung/ZTE and Qualcomm. It’s hard to comment on RAN1 part for RAN4 experts.
  + Spark: We share similar view as Charter, Cablelabs and Nokia, Ericsson.

**Issue 2-1-1: Subband filtering feasibility**

* Proposals/Observations from Samsung:
  + Observation 1: With high Q-value RF subband filter being located between the two-stage cascaded LNAs, gNB designer could have the UL subband as passband and a few numbers of PRBs as guard band to allow a desired suppression to filter out interference signals over DL subband(s).
  + Observation 2: High Q-value RF subband filter can be achieved by considering some new structure design for ceramic dielectric filter with reasonable size/weight for compact gNB design.
  + Observation 3: With reasonable RF subband filtering design, the self-interference signal caused by non-ideal RX selectivity is much smaller than the self-interference leakage to the UL subband because of non-ideal TX.
  + Observation 4: With RF subband filtering implemented, the IM3 caused by non-ideal RX selectivity can be mitigated to the level much lower than noise floor.
* Discussion:
  + QC: This will be captured into TR for feasibility part?
  + Samsung: Yes, for feasibility part.
  + Nokia: Simulation cannot resolve the real technology. We have didn’t view on the feasibility.
  + Ericsson: We need to consider the tradeoff Q values vs insertion loss for filtering design. We think the views among companies hard to converge.
  + Murata: We have similar view as Nokia. It’s challenge to implement this high Q value filtering.
  + Spark: We share similar view as Nokia and Ericsson. Temperature variation need to be considered.
  + ZTE: We have different views with companies who against sub-band filtering. Regarding insertion loss, sub-band filtering still feasible for some cases especially for some of BS classes with low power.
  + Huawei: We also think sub-band filtering can be promising technology. Implemented sub-band filter after LNA, insertion loss is not issue.
  + Samsung: We have analyze the size in our contribution. From Samsung perspective, we believe this is feasible; and insertion loss we agree with Huawei.

**Issue 2-1-2: Alternative solution with relaxed Q-value subband filter**

* Proposals/Observations from Samsung:
  + Observation 1: With the alternative solution with the subband filtering having a larger passband than the configured UL subband and larger transition bands for roll-off, the RF filter will be easier to be design.
* 
  + Proposal 1: RAN4 shall consider the alternative RF filter solution with subband filtering having a larger passband than the configured UL subband, which can help to improve the in-band blocking performance and keep a certain level of flexibility for SBFD subband configuration, but allow more easier RF subband filter design.
* Discussion:
  + Nokia/Ericsson: This can’t resolve the LNA linearity issue.

**Issue 2-1-3: Multi-carrier BS analysis**

* Proposals/Observations from Samsung:
  + Observation 1: Potentially, there are 2 kinds of interpretations of “multi-carrier” support for SBFD-capable BS:
    - Interpretation-1: SBFD operates in only one BS carrier, and legacy TDD operates in other intra-band BS carrier(s) contiguous or non-contiguous to the SBFD carrier;
    - Interpretation-2: SBFD operates in more than one BS carriers, and legacy TDD operates in the other intra-band BS carrier(s) (if any), which is contiguous or non-contiguous to the SBFD carriers.
  + Proposal 1: RAN4 shall only consider the interpretation-1 of multi-carrier support for SBFD-capable BS, i.e., SBFD operates in only one BS carrier, and legacy TDD operates in other intra-band BS carrier(s) contiguous or non-contiguous to the SBFD carrier.
* [Moderator]: Suggest to check P1 can be acceptable to all.
* Discussion:
  + Ericsson: P1 is reasonable, and the feasibility on interpretation-2 not covered in Rel-18 SI.
  + Samsung: For Rel-19 WI the work scope is belong to RAN-P decision.
  + QC: We agree with P1. We can capture into TP in rel-18 SI we only consider inter-pretation-1.
* Agreement:
  + During Rel-18 SI, RAN4 will only discuss the interpretation-1 of multi-carrier support for SBFD-capable BS, i.e., SBFD operates in only one BS carrier, and legacy TDD operates in other intra-band BS carrier(s) contiguous or non-contiguous to the SBFD carrier.
  + RAN4 didn’t study the feasibility for the case on interpretation-2 of multi-carrier support for SBFD-capable BS i.e., SBFD operates in more than one BS carriers, and legacy TDD operates in the other intra-band BS carrier(s) (if any), which is contiguous or non-contiguous to the SBFD carriers.

**Issue 3-1-3: Time-domain configuration for SBFD-capable BS RF requirement**

* Proposals/Observations from Samsung:
  + Proposal 1: For SBFD-capable BS, Existing RF requirements shall be applied in the OFDM symbols/slots others than SBFD symbols/slots; RAN4 discussion shall only be focused on RF requirement impacts in the SBFD symbols/slots.
  + Proposal 2: For SBFD-capable BS, RF requirement impacts for SBFD operation in symbols/slots configured as UL in *TDD-UL-DL-ConfigCommon* shall be treated as 2nd priority. More preferably, this scenario should be precluded in Rel-18 RAN4 study.
* Agreement:
  + Proposal 1: For SBFD-capable BS, Existing RF requirements shall be applied in the OFDM symbols/slots others than SBFD symbols/slots; RAN4 discussion shall only be focused on RF requirement impacts in the SBFD symbols/slots.
  + Proposal 2: For SBFD-capable BS, RF requirement impacts for SBFD operation in symbols/slots configured as UL in *TDD-UL-DL-ConfigCommon* shall be treated as 2nd priority.

**Issue 3-1-4: Frequency-domain configuration for SBFD-capable BS RF requirement**

* Proposals/Observations from Samsung:
  + Proposal 1: For SBFD-capable BS, RAN4 RF requirement study shall be discussed by restricting the maximum number of UL subbands for SBFD operation in an SBFD symbol/slot (excluding legacy UL symbol) within a TDD carrier to be one.
* Proposals/Observations from CATT:
  + Proposal 2: RB number for DL/UL subband and the guard band need to be decided in WI phase.
* Agreement: For SBFD-capable BS, RAN4 RF requirement study shall be discussed by restricting the maximum number of UL subbands for SBFD operation in an SBFD symbol/slot within a TDD carrier to be one.

**Issue 3-2-2: Output power dynamics**

* Proposals/Observations from Samsung/CATT/ZTE/Ericsson:
  + Proposal 1 (Samsung/ZTE): For output power dynamics requirement for SBFD-capable BS:
    - RE power control dynamic range: FFS the requirement set applicability and test applicability rule in work item stage.
    - Total dynamic range: Total dynamic range requirement for non-SBFD symbols is enough for SBFD-capable BS. It is not necessary to define a new total dynamic range requirement for SBFD operation on the DL subband(s).
  + Proposal 1a (CATT): Different for SBFD slot and normal slot, but it’s not necessary to test it.
  + Proposal 2 (Ericsson) Define the total power dynamic range requirement for SBFD slots as the range from declared rated power for SBFD slots to the power level for a single RB for non-SBFD slots.
* Agreement:
* RE power control dynamic range: Same requirements can be applied.
* Total dynamic range: Requirements applicable for SBFD slots
  + - FFS for the requirements limit and conformance testing

**Issue 3-2-3: Transmit ON/OFF power**

* Proposals/Observations from Samsung:
  + Observation 1: Transmitter OFF power requirement shall not be applied to SBFD operation in SBFD symbol(s).
  + Proposal 2: Existing transmit ON/OFF power:
    - Transmitter OFF power: Not applicable to SBFD-capable BS in SBFD symbols/slots.
    - Transmitter transient period (between transmitter ON and OFF period): Not applicable to SBFD-capable BS in SBFD symbols/slots.
* Discussion:
  + ZTE: We need to further the case within SBFD symbols and the boundary between non-SBFD symbols and SBFD symbols.
  + Ericsson: Need to further whether existing requirements still applicable.

**Issue 3-2-4: Transmitted signal quality**

* Proposals/Observations:
  + Proposal 1 (Huawei/Samsung/Ericsson): For transmitted signal quality:
    - All the existing requirements for frequency error, modulation quality (EVM) and time alignment error (TAE) shall also be applied to BS in SBFD symbols.
  + Proposal 1a (ZTE): to reuse the existing freq error, EVM and TAE requirement for SBFD BS and further discuss the joint measurement for normal DL symbols/slots and SBFD DL symbols/slots and necessity of relaxation of measurement period.
  + Proposal 2 (Samsung): For transmitted signal quality:
    - Tests shall be performed either on the DL signal in non-SBFD DL symbols or on the DL signal on the DL subband(s) in SBFD symbols, and test applicability rule can be FFS in the work item stage.
* Agreement:
  + For transmitted signal quality:
    - All the existing requirements for frequency error, modulation quality (EVM) and time alignment error (TAE) shall also be applied to BS in SBFD symbols.
    - Further discuss the joint measurement for normal DL symbols/slots and SBFD DL symbols/slots during WI phase.

**Issue 3-2-5: Unwanted emissions**

* Proposals/Observations on OBW from Samsung/Huawei/Ericsson/ZTE:
  + Proposal 1 (Samsung/Huawei/Ericsson/ZTE): For occupied bandwidth requirement: Apply the existing OBW requirement for the whole BS channel bandwidth in SBFD symbols.
* Proposals/Observations on OBUE from Samsung/Huawei/Ericsson/ZTE:
  + Proposal 2 (Samsung/Huawei/ZTE): For OBUE requirement: Only define OBUE requirement for the spectrum outside the whole BS channel bandwidth in SBFD symbols.
  + Proposal 3 (Ericsson): The RF bandwidth edge from which OBUE is defined is the edge of the carrier (same for both SBFD and non-SBFD slots).
* Proposals/Observations on transmitter spurious emission:
  + Proposal 3 (Samsung/ZTE): For transmitter spurious emission: All the existing requirements shall also be applied to SBFD-capable BS in SBFD symbols, except the requirement of protection of the BS receiver of own or different BS is not applicable for TDD oepration.
  + Proposal 3a (Huawei/Ericsson): no change is needed for transmitter spurious emission
* Proposals/Observations from CMCC on “co-located with other BSs”:
  + Observation 1: legacy 30dB MCL assumption between co-located gNB will lead to blocking of SBFD receiver.
  + Proposal 4: before defining co-location requirements, it’s suggested to discuss the MCL assumption for co-location with following two kind of assumption.
    - Re-evaluate whether 30dB MCL assumption is still typical assumption since large scale antenna element is used which will contribute to directional beam compared with 2G area. This MCL is the MCL that doesn’t consider any deployment restriction or isolation material.
    - Define one typical MCL value assuming careful deployment plan and possible isolation material. This MCL value is used to show whether under careful planning, the co-location operation is feasible or not and give more guidance for commercial deployment.
  + Proposal 5: more simulation of 0% grid shift with reasonable co-location MCL assumption is required before define adjacent channel co-location requirements, e.g. ACLR, ACS and blocking requirements.
* Proposals/Observations from Huawei on co-location/co-existence:
  + Proposal 6: for co-location and co-existence with other base station in different bands, existing requirements are applicable for SBFD capable gNB.
* Proposals/Observations from Ericsson on co-location/co-existence:
  + Observation 2: Conformance to co-existence and co-location requirements is declared
  + Observation 3: Co-existence and co-location requirements are already designed to consider unsynchronized TDD between non-adjacent bands
  + Proposal 7: Use the same co-existence and co-location requirements (between bands) for SBFD slots as normal TDD. Conformance to these requirements remains declaration based.
* Proposals/Observations from CATT/ZTE on co-location/co-existence:
  + Observation 4: Co-location requirement can’t use 30 dB coupling loss as the coupling loss assumption for SBFD capable gNB co-location related requirement.
* Agreement:
  + OBW: For occupied bandwidth requirement: Apply the existing OBW requirement for the whole BS channel bandwidth in SBFD symbols/slots.
  + OBUE: The RF bandwidth edge from which OBUE is defined is the edge of the carrier (same for both SBFD and non-SBFD symbols/slots).
  + Transmitter spurious emission: All the existing requirements shall also be applied to SBFD-capable BS in SBFD symbols,
    - Note: The requirement of protection of the BS receiver of own or different BS is not applicable for TDD operation.
  + Co-location/co-existence:
    - Option 1: Co-location requirement can’t use 30 dB coupling loss as the coupling loss assumption for SBFD capable gNB co-location related requirement.
    - Option 2: No update on existing requirements, it’s declaration basis whether BS need to follow the requirements. FFS whether applicable for SBFD symbols/slots.

**Issue 3-2-6: Transmitter intermodulation**

* Proposals/Observations from Nokia/Huawei/ZTE:
  + Observation 1 (Nokia): The SBFD Tx IMD performance might be able to be guaranteed by the legacy Tx intermodulation requirements.
  + Proposal 1 (Huawei/ZTE): for SBFD capable gNBs, existing IMD requirements are applicable for normal DL slots and not applicable during SBFD time slots.
  + Proposal 1a (ZTE): if Tx requirement is considered for SBFD slots, then to add the Refsens degradation as one more performance metric in addition to transmitter OBUE/ACLR/spurious emission requirements.
* Proposals/Observations from Samsung/Ericsson:
  + Proposal 3 (Samsung/Ericsson): The transmitter intermodulation requirement shall still be applicable during SBFD symbols:
    - Proposal 3a (Samsung): Whether or not RAN4 can reuse the interfering signal level with 30dB coupling loss can be further discussed in work item stage.
    - Proposal 3b (Ericsson): The SBFD BS is not expected to receive in the RX sub-band during TX IMD testing.
  + Proposal 4 (Samsung): The transmitter intermodulation level shall not exceed the unwanted emission limits in clauses 6.6.3, 6.6.4 and 6.6.5 in the presence of an NR interfering signal.
    - No need to consider receiver degradation for transmitter intermodulation requirement.
* Proposals/Observations from CMCC:
  + Proposal 5: before defining Tx IMD requirements during SBFD time slot, it’s suggested to find out whether co-located gNB would block SBFD receiver.
* Proposals/Observations from CATT:
  + Proposal 6: Revisit the following agreement in last RAN4 meeting,
    - Existing IMD requirements still applicable for normal DL slots on SBFD capable gNBs
  + Proposal 7: The co-location scenario should be revisited for SBFD deployment. How the co-location BS works on the SBFD slots should be considered.
* Agreement:
  + FFS whether Tx IMD requirements applicable for SBFD slots/symbols

**Issue 3-3-1: Reference sensitivity level and OTA sensitivity**

* Proposals/Observations from Samsung:
  + Proposal 1: For conducted reference sensitivity level:
    - The existing requirement for conducted reference sensitivity level shall also be applied to BS in SBFD symbols, i.e, no degradation allowed.
    - Self-interference from TX from transmission in the DL subband(s) is not relevant in the conducted testing.
    - UL subband bandwidth shall be used for BS channel bandwidth in the existing requirement.
* Proposal from CATT:
  + Proposal 1: No conducted REFSENS requirement is needed for SBFD slot.
* Proposal from Huawei:
  + Proposal 2: New OTA sensitivity requirements in SBFD time slot with self-interference only need to be specified in WI phase
    - Candidate value [0.5 ~1.0] dB degradation
      * Final value will be specified in WI phase.
* Proposal from ZTE:
  + Proposal 3a: for the conducted refsens conformance testing, the antenna should be installed during the conformance testing otherwise there are no self interference injected by the OTA.
  + Proposal 3b: for Refsens of SBFD symbols/slots, to define two set of requirement: 1) self interference; 2) self interference+ inter-sector co-channel interference;
  + Proposal 3c: further discuss the degradation levels for Set 1 requirement and Set 2 requirement;
  + Proposal 3d: to further discuss the FRC for Refsens of SBFD UL symbols/slots in the WID phase.
  + Proposal 3f: propose not to consider the digital IC impacts explicitly in SBFD BS conformance testing which is up to the implementation.
  + Proposal 3g: to de-prioritize or not define the conducted conformance testing for SBFD BS if the radiated conformance testing is mandatory.
  + Proposal 3h: for the co-site inter-sector, in-channel blocking, in-channel selectivity and in-channel sub-band leakage, this could be left up to the vendor declaration without defining any specific power or freq offset of the corresponding requirement.
  + Proposal 3i: for the inter-site scenario, propose to further discuss how to handle the BS CLI problem e.g. with RAN4 minimum RF requirement (usually worst assumptions) or with other coordination schemes defined in other WGs.
* Agreement:
  + For BS type 1-H if supported: The existing requirement for conducted reference sensitivity level shall also be applied to BS in SBFD symbols, i.e, no degradation allowed.
  + For BS type 1-C: FFS whether supported for SBFD capable BS, FFS for the requirements and conformance testing

Issue 3-3-2: Dynamic range

* Proposals/Observations from Samsung/Huawei:
  + Proposal 1: Conducted dynamic range: The existing requirements shall also be applied to BS in SBFD symbols, and self-interference from TX from transmission in the DL subband(s) is not relevant in the conducted testing.
  + Proposal 2: OTA dynamic range: The existing requirements shall also be applied to BS in SBFD symbols and the self-interference impact can be ignored.
* Proposals/Observations from CMCC:
  + Proposal 3: new requirement is needed to evaluate SBFD receiver to receive wanted signal with presence of AWGN interference signal on top of residual self-interference.
* Proposals/Observations from CATT:
  + Proposal 5: Different for SBFD slot and normal slot, but it’s not necessary to test it.
* Proposals/Observations from ZTE:
  + Proposal 6a: for dynamic range requirement of SBFD UL symbols/slots, to consider both DL transmission as interfer in addition to wide-band AGWN interfer and UL configuration as wanted signal;
  + Proposal 6b: to further discuss the IoT level for dynamic range requirement of SBFD uplink symbols/slots;
  + Proposal 6c: to further discuss the FRC for wanted signal and interference signal for dynmic range requirement of SBFD UL symbols/slots in the WID phase.
* Agreement: Dynamic range requirements applicable for SBFD symbols/slots
  + FFS for IoT level, and wanted signal power level

**Sub-topic 3-4: Potentially new requirements for SBFD operation**

*Sub-topic description:*

**Issue 3-4-1: Transmitter transient period between SBFD and non-SBFD**

* Proposals/Observations from Samsung/Nokia/Ericsson:
  + Proposal 1 (Samsung/Nokia/Ericsson/ZTE): For transmitter transient period between SBFD and non-SBFD: ~~New~~ requirement shall be introduced to BS in SBFD symbols, by defining the transient period as the time period which the transmitter is changing from the SBFD operation to non-SBFD operation or vice versa.
* Proposals/Observations from Ericsson:
  + Observation 1 (Ericsson): The same considerations on inter-site interference due to switching occur for SBFD resources when switched between TX/RX as when the whole slot is switched.
  + Proposal 2 (Ericsson): Apply the TDD switching time and off level requirement to SBFD RBs when they are switched between TX and RX.
* Proposals/Observations from Huawei/CATT:
  + Proposal 3: Transmitter ON-OFF power and transition period for SBFD operation can be covered by regular TDD requirement and no new specific to SBFD is needed.
  + Proposal 4: The transition period between the SBFD slot and the normal slot is left to implementation.
* Proposals/Observations from ZTE:
  + Proposal 5: to consider the guard periods at the beginning of SBFD UL symbols/slots.
* Agreement:
  + For transmitter transient period between SBFD and non-SBFD or SBFD reconfigurations if needed: requirement shall be introduced to BS in SBFD symbols/slots, by defining the transient period as the time period which the transmitter is changing from the SBFD operation to non-SBFD operation or vice versa, or during SBFD reconfigurations.

**Issue 3-4-2: In-channel adjacent subband leakage ratio, In-channel adjacent subband Blocking and adjacent subband selectivity**

* Proposals/Observations from Samsung:
  + Proposal 1: For SBFD-capable gNB, RAN4 shall not introduce new in-channel adjacent subband requirements, including:
    - in-channel adjacent subband leakage ratio,
    - in-channel adjacent subband blocking and
    - in-channel adjacent subband selectivity.
* Proposals/Observations from CMCC/Nokia/Huawei/Ericsson/CATT:
  + Proposal 2 (CMCC/Nokia/Huawei/Ericsson/CATT): new RF requirements should be specified for co-site inter-sector gNB and inter-site gNB, following list the candidate options, partial or all of which can be defined in WI stage.
    - in-channel adjacent subband leakage ratio,
    - in-channel adjacent subband blocking and
    - in-channel adjacent subband selectivity.
    - Adjacent sub-band SEM requirements (Moderator: Need to double check?)
  + Proposal 2a (Huawei): Following new RF requirements can be specified for co-site inter-sector and/or inter-site interference in WI phase:
    - In-channel adjacent sub-band blocking requirements
      * Cover both blocking and adjacent sub-band selectivity
    - In-channel adjacent sub-band leakage requirements
      * 45 dB PSD difference for FR1 and 28 dB PSD difference for FR2-1 can be used as a starting point
  + Proposal 2b (Ericsson): Consider a requirement on the absolute level of emissions in the RX sub-band
  + Proposal 2c (CATT): Whether both conducted and OTA requirements are defined can be decided in WI phase.
  + Proposal 2d (ZTE): for in-channel emission, to consider this emission in the gNB Refsens degradation via self interference and inter-sector interference as shown in Figure 2.1.4-1 implicitly.

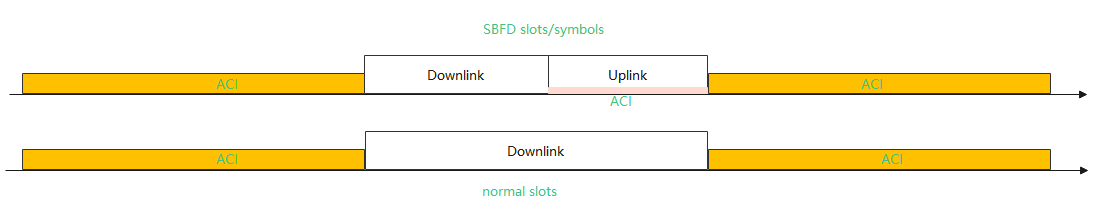


Figure 2.1.4-1: Example of ACLR requirement of SBFD slots

* Agreement:
  + FFS whether new requirements need to be specified for co-site inter-sector gNB and inter-site gNB with candidate list as following
    - in-channel adjacent subband leakage ratio,
    - in-channel adjacent subband blocking and
    - in-channel adjacent subband selectivity.

**R4-2313866 Ad-hoc minutes for SBFD operation**

*Type: other For: Approval  
 Source: Samsung*

**Decision: Approved.**

**R4-2313867 WF for feasibility and BS requirements impact on SBFD operation**

*Type: other For: Approval  
 Source: Samsung*

**Abstract:**

**Decision: Approved.**

**R4-2313868 WF for regulatory aspect**

*Type: other For: Approval  
 Source: Cablabs*

**Decision: Approved.**

**[108][307] FS\_NR\_duplex\_evo\_Part2, AI 8.19.2.2.3, 8.19.2.2.4, 8.19.2.4**

**R4-2314243 Topic summary for [108][307] FS\_NR\_duplex\_evo\_Part2**

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

**Decision: Noted.**

**Issue 2-1: Company views on subband filtering**

* Proposals
  + Proposal 1: As before companies are encouraged to provide their views on any aspects of the UE, including, for example ,subband filtering.
* Discussion:
  + QC: We believe the discussion can be continued during WI phase.
  + vivo: We didn’t see strong evidence any enhancement needed.
  + Ericsson: It’s better to keep it open during study phase.

**[108][308] FS\_NR\_duplex\_evo\_Part3, AI 8.19.2.1**

**R4-2314244 Topic summary for [108][308] FS\_NR\_duplex\_evo\_Part3**

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

**Decision: Noted.**

**Topic #1 Simulation assumption**

**Issue 1-1: LS**

* Proposals
  + Option 1: RAN4 should consider sending an LS to RAN1 describing the observed detrimental BS-to-BS interference for legacy TDD networks when SBFD operates in UL slots. (CableLabs)
* Discussion:
  + Charter: We observe much degradation on UL slots, and we can inform RAN1 for the conclusion from RAN4.
  + Cablelabs: We agree with Charter.
  + QC: What’s the expectation for RAN1 with this LS? It’s a SI, we can draw conclusion and captured into TR.
  + Samsung: We share similar view with moderator and QC. RAN1 always can get such message based on TR.
  + Ericsson: We understand the motivation on this. We can consider to send to RAN.

**Issue 1-5-1: priority of scenarios and cases**

* Proposals
  + Option 1: Based on input from RAN LS set high priority for Scenario 4 and Case 1 and 2 for all Scenarios. (Ericsson)
* Agreement:
  + For scenario 4, high priority.
  + For other scenarios, maintain previous priority.

**Issue 1-5-2: Tx power and bandwidth for UMi-to-UMi scenario**

* Proposals
  + Option 1: 46dBm/100MHz
  + Option 2: 38dBm/100MHz
* Agreement:
  + both option 1 and option 2 and companies choose either one or both in their simulation.

**Issue 1-5-3: except for above parameters, other parameters for UMi-to-UMi scenario**

* Proposals
  + Option 1: the same as used in Uma-to-UMi scenario, i.e. defined in R4-2305922
  + Option 2: TBA
* Agreement:
  + Option 1 agreed

**Issue 1-5-6: scenario 7 FR2 Urban Hotspot -> Urban Hotspot**

* Proposals
  + Option 1: down-select this scenario 7 from the study given the FR2 (Samsung, CableLabs)
    - Scenario 7 is not suitable for utilizing Macro BS to serve the assumed 80% of high proportion indoor UEs. (Samsung)
    - Scenario 7 The SNR (without any type of interference) is below -10 dB for approximately 40% of probability. This is due to 80% of UE locations being indoor, and high path loss and O2I loss in FR2. We doubt if scenario 7 is a valid scenario for the coexistence analysis. (CableLabs)
  + Option 2: TBA
* Agreement:
  + Down-select this scenario 7 from the study given the FR2

**Issue 1-8-1: sub-band filter**

* Proposals
  + Option 1: it is proposed to consider the sub-band filter per operator for the new deployment band which can enable more deployment scenarios. (Huawei)
  + Option 2: TBD
* Agreement: Companies are encouraged to bring more analysis on possible solution to enable more deployment scenarios which not reflected by existing co-existence simulation e.g. the sub-band filter per operator.

**Issue 1-3-1: adjacent channel selectivity for each base station type**

* Proposals
  + Option 1: RAN4 to confirm the coexistence simulation assumptions for the adjacent channel selectivity for each base station classes. (Nokia)
    - * 50 dBc as baseline for wide area base stations.
      * 41 dBc as baseline for medium range base stations.
      * 38 dBc as baseline for local area base stations.
  + Option 2: 50dBc for all BS classes
* Agreement:
  + Maintain the agreement for co-existence assumption

**Issue 1-2-1: principle for penetration loss for hotspot scenario**

* Proposals
  + Option 1: Indoor-to-outdoor penetration losses are not calculated for pairs of indoor UEs deployed in the same cluster area. (Nokia, CableLabs)
  + Option 2: For indoor UEs in different clusters, a single penetration loss component is calculated. The indoor distance used for the calculation depends on the 2D distance between the pair of UEs. (Nokia)
* Agreement
  + [Indoor-to-outdoor penetration losses are not calculated for pairs of indoor UEs deployed in the same cluster area]
  + For indoor UEs in different clusters, a single penetration loss component is calculated. The indoor distance used for the calculation depends on the 2D distance between the pair of UEs.

**Issue 1-2-2: how to generate for a UE-UE link associated with an indoor UE**

* Proposals
  + Option 1: follow same approach as RAN1. The following is used to generate for a UE-UE link associated with an indoor UE (the other UE could be an outdoor UE or an indoor UE in a different building) in order to calculate the inside loss component () of the UE-UE O2I building penetration loss (Nokia)
  + Option 2: TBA
* Agreement:
  + Option 1

**Topic #2 collection of simulation results**

###### Sub-topic 2-2 Scenario 1 FR1 Urban Macro -> Urban Macro (High priority)

**Case 1: aggressor SBFD DU victim NR TDD DL (high priority)**

* Agreements
  + All the simulation results for 100% grid shift and baseline assumption show SINR/throughput degradation is acceptable for both SBFD antenna configuration 1 and 2.

**Case 2: aggressor SBFD DU victim NR TDD UL (low priority)**

* For 100% grid shift and baseline assumption, interference is higher than 5% throughput loss is observed.
* The degradation is even worse for less grid shift.

**Case 3: aggressor NR TDD DL victim SBFD DU (high priority)**

* For aggressor NR TDD DL interfere SBFD UL:
  + For 100% grid shift, interference is higher than 5% throughput loss is observed.
    - The degradation is even worse for less grid shift.
    - For 100% grid shift , no 100% UL throughput loss is observed at SBFD receiver
  + [Regarding blocking probability, only one company show the results e.g. 2% blocking from Ericsson, any inputs are welcome.]
* For aggressor NR TDD DL interfere SBFD DL: TBD

**Case 4: aggressor NR TDD UL victim SBFD DU (low priority)**

* Agreement: For 100% grid shift and baseline assumption, interference is acceptable for cell average, FFS for cell edge.

###### Sub-topic 2-7 Scenario 6 FR2 Urban Macro -> Urban Macro (high priority)

**Case 1: aggressor SBFD DU victim NR TDD DL (high priority)**

* All the simulation results for 100% grid shift show SINR/throughput degradation is acceptable with current or enhanced ACIR.

**Case 2: aggressor SBFD DU victim NR TDD UL (low priority)**

* With baseline assumption, all the simulation results for 100% grid shift show SINR/throughput degradation is acceptable with current or enhanced ACIR
* Some companies show simulation results is extremely sensitive to parameters like the GS and the BS transmission power.

**Case 3: aggressor NR TDD DL victim SBFD DU (high priority)**

* For aggressor NR TDD DL interfere SBFD UL:
  + For 100% grid shift, interference is acceptable with current or increased ACIR
  + For less than 100% grid shift or BS power is increased, interference maybe larger than 5% loss and one company show 4% blocking probability at cell edge
* For aggressor NR TDD DL interfere SBFD DL: interference is acceptable for 100% grid shift.

**Case 4: aggressor NR TDD UL victim SBFD DU (low priority)**

* For 100% grid shift and baseline assumption, interference is acceptable for the case when NR TDD UL interfere SBFD UL and DL
* [Some companies show simulation results is extremely sensitive to parameters like the GS and the BS transmission power.]

###### Sub-topic 2-4 Scenario 3 FR1 Indoor -> Indoor (2nd priority)

* Under baseline assumptions and 100% grid shift, the interference between legacy TDD and SBFD using adjacent channel is acceptable, i.e. less than 5% for both SBFD antenna configuration 1 and configuration 2.

###### Sub-topic 2-5 Scenario 4 FR1 UMa-to-UMi (2nd priority)

**Case 1: aggressor SBFD DU victim NR TDD DL (high priority)**

* Based on the collected simulation results for 100% grid shift till August RAN4 meeting and baseline assumption show SINR/throughput degradation is acceptable.

**Case 2: aggressor SBFD DU victim NR TDD UL (low priority)**

* For 100% grid shift and baseline assumption, interference is higher than 5% throughput loss is observed.
  + It’s observed that the degradation is even worse with 50% grid shift based on the results in [xxx] submitted in RAN4#108

###### Sub-topic 2-6 Scenario 5 FR1 UMi -> FR1 UMi (2nd priority)

**Case 1: aggressor SBFD DU victim NR TDD DL (high priority)**

* At cell-average, all the simulation results for 100% grid shift show SINR/throughput degradation is acceptable whether the gNB Tx power is 46dBm/100M or 38dBm/100MHz.
* Furthder discuss the cell edge impact

**Case 2: aggressor SBFD DU victim NR TDD UL (low priority)**

* For 100% grid shift, simulation results are much sensitive to gNB Tx power. For lower power, i.e. 38dBm/100MHz, interference is acceptable whereas for high power, i.e. 46dBm/100MHz interference is higher than 5% throughput loss is observed.

**Case 3: aggressor NR TDD DL victim SBFD DU (high priority)**

Agreement:

* For aggressor NR TDD DL interfere SBFD UL:
  + For 100% grid shift, simulation results are much sensitive to gNB Tx power. For lower power, i.e. 38dBm/100MHz, interference is acceptable with current or enhanced ACIR whereas for high power, i.e. 46dBm/100MHz interference is higher than 5% throughput loss is observed.
* For aggressor NR TDD DL interfere SBFD DL: interference is acceptable

**Case 4: aggressor NR TDD UL victim SBFD DU (low priority)**

* For 100% grid shift and baseline assumption, interference is acceptable.

**R4-2313871 Ad-hoc minutes for SBFD co-existence study**

*Type: other For: Approval  
 Source: CMCC*

**Discussion:**

* Charter: For the case with SBFD in UL slot, we observe larger performance degradation compared to SBFD operation on DL slot.
* CMCC: We already have observations in case-by-case manner. It already provides sufficient information. We also clarify the observations were based on the collected results till RAN4#108.
* ZTE: We agree with CMCC.
* QC: We also agree with CMCC.

**Decision: Approved.**

**R4-2313872 WF for SBFD co-existence study**

*Type: other For: Approval  
 Source: CMCC*

**Decision: Approved.**

Agreements:

* For Scenario 4 FR1 UMa-to-Umi, with case 2 (Case 2: aggressor SBFD DU victim NR TDD UL),100% grid shift and baseline assumption, higher than 5% throughput loss is observed which is worse than case 1 (Case 1: aggressor SBFD DU victim NR TDD DL)
  + It’s observed that the degradation is even worse with 50% grid shift based on the results in R4-2313631 submitted in RAN4#108

**R4-2313985 Collection of simulation results for SBFD co-existence study**

*Type: other For: Information   
 Source: Samsung*

**Discussion:**

**Decision: Noted.**

### 8.26 NR NTN enhancement

#### 8.26.1 General and work plan

##### 8.26.1.1 System parameters

**R4-2311642 Discussion on the remaining issues for NTN system parameters**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2313172 Further discussion on system parameter for NTN in Ka band**

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

**Decision: Noted.**

**R4-2313238 NTN enhancement: System parameters**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

##### 8.26.1.2 Regulatory information

**R4-2313242 CR to TS 38.863: NTN Ka-band – Regulatory aspects**

*Type: CR For: Agreement  
 38.863 v17.2.0 CR-0007 rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Discussion:**

Inmarsat: We would like to have more time to check.

**Decision: Postponed.**

**R4-2313863 CR to TR 38.863: NTN Ka-band – Regulatory aspects**

*Type: CR For: Agreement  
 38.863 v17.2.0 CR-0007 rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Decision: Withdrawn.**

##### 8.26.1.3 Others

**R4-2311232 On DMRS bundling with doppler pre-compensation for NTN**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2312976 Discussion on DMRS bundling**

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

**Decision: Noted.**

**R4-2313459 On PUSCH DMRS bundling for NR NTN coverage enhancement**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313643 Discussion on LS on PUSCH DMRS bundling for NR NTN coverage enhancement**

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

**Decision: Noted.**

**R4-2313845 NTN UE types above 10 GHz and beam steering**

*Type: discussion For: Discussion  
 Source: Inmarsat*

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

#### 8.26.2 Co-existence study for above 10GHz bands

**R4-2311600 Further discussion on remaining issues about simulation assumptions for above 10GHz NTN co-existence study**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2311602 Ka-band NTN co-existence calibration result**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2312443 Updates on NTN calibration and coexistence simulation results for above 10 GHz**

*Type: discussion For: Discussion  
 Source: THALES, Magister Solutions Ltd*

**Decision: Noted.**

**R4-2312891 Simulation assumptions for NTN co-existence above 10GHz bands**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

**R4-2312973 Initial simulation results for Rel-18 NTN coexistence study**

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

**Decision: Noted.**

**R4-2312974 Discussion on Rel-18 NTN coexistence study assumption**

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

**Decision: Noted.**

**R4-2313087 Discussion of simulation assumptions and temporary results for above 10GHz NTN co-existence study**

*Type: discussion For: Discussion  
 Source: Samsung Electronics Nordic AB*

**Decision: Noted.**

**R4-2313101 Simulation calibration assumptions and results for above 10GHz NTN co-existence study**

*Type: discussion For: Discussion  
 Source: Samsung Electronics Nordic AB*

**Decision: Noted.**

**R4-2313173 Further discussion on simulation assumption and calibration data for NTN in Ka band**

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

**Decision: Noted.**

**R4-2313239 NTN enhancement: coexistence simulations assumptions**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313240 NTN enhancement: coexistence simulations results**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

#### 8.26.3 SAN RF requirements

**R4-2311601 Further discussion on SAN RF requirements for above 10GHz bands**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2312758 SAN requirements and NF in above 10 GHz**

*Type: discussion For: Discussion  
 Source: THALES*

**Decision: Noted.**

#### 8.26.6 Moderator summary and conclusions

**[108][309] NR\_NTN\_enh\_Part1, AI 8.26.1**

**R4-2314245 Topic summary for [108][309] NR\_NTN\_enh\_Part1**

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

**Decision: Noted.**

**Topic #1 System parameters**

**Issue 1-1-1:** Smaller CBW

* Proposals
  + Option 1: The small CBW request should be proposed in RAN1 (and RAN2), the study and discussion should be led by RAN1. (O1 & P2/[R4-2311642](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311642.zip))
* Discussion:
  + CATT: This is related to smaller SCS and SSB. From FR2 TN specification, only 50MHz above CHBW with larger SCS can be supported.
  + Thales: We already send LS to RAN1.
* Agreement: Postpone the discussion on small CHBW and shorter CP until we receive clear demand/request to support this.

**Topic #2 GSCN**

**Issue 1-2-1: GSCN**

* **Proposals**
  + **Option 1: to use following GSCN for Ka-band as (P1/**[**R4-2313172**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313172.zip) **with Excel file from 06/2019 as proof for calculations, P1/**[**R4-2313238**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313238.zip) **without NOTE 1)**

Table 4: Applicable SS raster entries per *operating band* (FR2-NTN)

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern (note 1) | Range of GSCN  (First – <Step size> – Last) |
| **n512** | **120 kHz** | **Case D** | **17448 – <12> – 19428** |
|  | **240 kHz** | **Case E** | **17472– <24> – 19416** |
| **n511** | **120 kHz** | **Case D** | **17448 – <12> – 19428** |
|  | **240 kHz** | **Case E** | **17472– <24> – 19416** |
| **n510** | **120 kHz** | **Case D** | **17448 – <12> – 19428** |
|  | **240 kHz** | **Case E** | **17472– <24> – 19416** |
| **NOTE 1: SS Block pattern is defined in section 4.1 in TS 38.213.** | | | |

* + **Option 2: (P1/**[**R4-2311642**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311642.zip)**)**

Table 2: Applicable SS raster entries per *operating band*

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern (note 1) | Range of GSCN  (First – <Step size> – Last) |
| **n512** | **120 kHz** | **Case D** | **17444 – <12> – 19424** |
|  | **240 kHz** | **Case E** | **17456 – <24> – 19400** |
| **n511** | **120 kHz** | **Case D** | **17444 – <12> – 19424** |
|  | **240 kHz** | **Case E** | **17456 – <24> – 19400** |
| **n510** | **120 kHz** | **Case D** | **17444 – <12> – 19424** |
|  | **240 kHz** | **Case E** | **17456 – <24> – 19400** |
| **NOTE 1: SS Block pattern is defined in section 4.1 in TS 38.213.** | | | |

* **Recommended WF**
  + **Companies encouraged to check the Excel file with the computation Table from** [**R4-2313172**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313172.zip)
  + **In the past there were some Excel files to compute the values, and it seems that Option 1 is corresponding. Please take a look here: https://www.3gpp.org/ftp//Specs/archive/38\_series/38.817-01/38817-01-f50.zip**
  + **If no strong concerns, it is recommended to consider Option 1 (since the same methodology has already been used in the past). It can be also noted that the number of entries for the two Options is identical:**
    - **Option 1: 166 values for 120kHz and 82 values for 240kHz**
    - **Option 2: 166 values for 120kHz and 82 values for 240kHz**
* **Discussion:**
  + CATT: We consider the distance from FR2 TN sync raster.
  + Ericsson: Any issue with option 1?
* Tentative agreement: Option 1.

**Topic #3 DMRS bundling feature**

**Issue 1-3-1:** Timing accuracy/UE transmit timing requirement

* Proposals
  + Option 1: RAN4 investigate the feasibility of an NTN UE to meet the DMRS requirement in the new test condition where DL time would be changing for non-GEO satellite. (P1/[R4-2313459](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313459.zip))
    - Note 1: It is not clear whether the UE will introduce additional time error when making the phase pre-compensation due to time drift in RAN1 working assumption. (O1/[R4-2313459](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313459.zip))
    - Note 2: There is no time accuracy requirement regarding the NTN UE phase pre-compensation in TS 38.133. (O2/[R4-2313459](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313459.zip))
    - Note 3: There is no DL time change in DRMS bundling requirement in TS 38.101-1 and therefore the DL timing change for Non-GEO brings question on the validity of the DMRS bundling requirement for NTN UE. (O3/[R4-2313459](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313459.zip))
  + Option 2: RAN4 should further discuss the applicability of the DMRS bundling feature to Rel-18 NTN and determine whether additional NTN-specific side conditions are needed. (P1/[R4-2311232](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311232.zip))
    - Note 1: RAN4 should update the TA side condition of the maximum allowable phase difference for DMRS bundling requirement to align with the timing pre-compensation procedure used in NTN networks. (O1/[R4-2311232](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311232.zip))
    - Note 2: RAN4 should determine whether additional side conditions on the maximum DMRS bundling length and/or RB allocations are needed for the requirement on the maximum allowable phase difference for DMRS bundling in NTN operation. O2/[R4-2311232](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311232.zip))
    - Note 3: It is expected that the values of the maximum allowable phase difference for DMRS bundling captured in Table 6.4.2.5-1 of TS38.101-1 will remain applicable for NTN. (O3/[R4-2311232](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311232.zip))
  + Option 3: RAN4 to update UE transmit timing requirement (7.1C in 38.133) for NTN-specific PUSCH DMRS bundling, with the RAN1 working assumption: “UE shall not perform TA pre-compensation update within an actual TDW if it causes phase discontinuity that may violate the phase difference limit”. Where the actual TDW is according to RAN1’s conclusion. (P1/[R4-2313643](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313643.zip))
  + Option 4: For NTN-specific PUSCH DMRS bundling, update the applicability of the timing requirements such that the requirements apply only for the first transmission in the TDW. (P1/[R4-2312976](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2312976.zip))
* Recommended WF
  + TBA
  + Moderator Note: it was suggested (but not agreed as potential WF for discussion) a combination of different Options:
    - RAN4 investigate the feasibility of an NTN UE to meet the DMRS requirement in the new test condition where DL time would be changing for non-GEO satellite.
      * Taking existing requirements specified for the maximum allowable phase difference for DMRS bundling captured in Table 6.4.2.5-1 of TS38.101-1 as starting point
        + FFS any update on the side conditions needed or not which also need to be compliant with RAN1 design
    - If required, update UE transmit timing requirement (7.1C in 38.133) for NTN-specific PUSCH DMRS bundling:
      * Option 1: RAN4 to update UE transmit timing requirement (7.1C in 38.133) for NTN-specific PUSCH DMRS bundling, with the RAN1 working assumption: “UE shall not perform TA pre-compensation update within an actual TDW if it causes phase discontinuity that may violate the phase difference limit”.
      * Option 2: such that the requirements apply only for the first transmission in the TDW

Agreement:

* RAN4 investigate the feasibility of an NTN UE to meet the DMRS requirement in the new test condition where DL time would be changing for non-GEO satellite.
  + Taking existing requirements specified for the maximum allowable phase difference for DMRS bundling captured in Table 6.4.2.5-1 of TS38.101-1 as starting point
    - FFS any update on the side conditions needed or not which also need to be compliant with RAN1 design
* From RRM requirements perspective to support NTN-specific PUSCH DMRS bundling:
  + - Option 1: update the applicability of the timing requirements such that the requirements apply only for the first transmission in the TDW.
    - Other options not precluded

**R4-2313864 WF for NTN general part**

*Type: other For: Approval   
 Source: Thales*

**Discussion:**

**Decision: Approved.**

**[108][310] NR\_NTN\_enh\_Part2, AI 8.26.3**

**R4-2314246 Topic summary for [108][310] NR\_NTN\_enh\_Part2**

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

**Decision: Noted.**

**Issue 1-1-1:** EISREFSENS\_50M definition - Bandwidth

* Proposals: BW for EISREFSENS\_50M for Ka-band SAN is 66RB, i.e. 66\*12\*60\*1000Hz
  + Agree
  + Disagree
* Agreement: Proposals: BW for EISREFSENS\_50M for Ka-band SAN is 66RB, i.e. 66\*12\*60\*1000Hz

**Issue 1-1-2:** EISREFSENS\_50M definition - SNR

* Proposals: -1dB SNR can be reused for EIS for Ka-band SAN.
  + Agree
  + Disagree
* Agreement: Proposals: -1dB SNR can be reused for EIS for Ka-band SAN.

**Issue 1-2: FRC**

* Proposals: The G-FR2-A1-1, G-FR2-A1-2 and G-FR2-A1-3 for FR2-1 TN BS can be reused for Ka-band SAN.
  + Agree
  + Disagree
* Agreement: Proposals: The G-FR2-A1-1, G-FR2-A1-2 and G-FR2-A1-3 for FR2-1 TN BS can be reused for Ka-band SAN.

**Issue 1-3-1: SAN Noise Figure**

* Proposals: RAN4 to use 1 single SAN NF of 3.5 dB in above 10 GHz.
  + Agree
  + Disagree
* Agreement:
  + For GEO: 3.5 dB
  + For LEO with two classes:
    - 3.5 dB
    - 5.9 dB

**R4-2313902 WF for SAN RF requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2313996 (from R4-2313902).**

**R4-2313996 WF for SAN RF requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Agreed.**

**[108][311] NR\_NTN\_enh\_Part3, AI 8.26.2**

**R4-2314247 Topic summary for [108][311] NR\_NTN\_enh\_Part3**

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

**Decision: Noted.**

**Issue 1-1: Scenario**

* Proposals
  + Option 1: To deprioritize scenario 7 and 8

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Combination | Aggressor | Victim | Frequency band | Scope of Coexistence Simulation |
| 7 | TN with NTN | NTN DL | TN UL | 17 GHz | ACLR NTN SAN to be varied/defined  ACS TN gNB fixed |
| 8 | TN with NTN | TN UL | NTN DL | 17 GHz | ACLR TN UE fixed  ACS NTN UE to be varied/defined |
| NOTE 1: For coexistence between Ka-Band DL and adjacent TN bands, there are no 3GPP defined/specified TN bands. | | | | | |

* Agreement:
  + Option 1 agreed

**Issue 1-2: NTN FRF**

* Proposals
  + Option 1: FRF=2 for co-existence study with 2 polarization
    - There is no interference leakage between polarization branch.
  + Option 2: FRF=3 for co-existence study
* Agreement: Option 1: FRF=2 for co-existence study with 2 polarization
  + FFS whether need to consider interference leakage between polarization branch for co-existence simulation purpose or not

**Issue 1-3: NTN UE elevation angle**

* Proposals
  + Option 1: 30 degree
  + Option 2: 20 degree
* Agreement: considering 25 degree in additional to 90 degree

**Issue 1-4: NTN UE pointing accuracy**

* Proposals
  + Option 1: NTN UE antenna points to the satellite accurately
* Agreement:
  + Option 1 agreed

**Issue 2-1-1: NTN SAN Channel Bandwidth**

* Proposals
  + Option 1: 200MHz per beam
* Agreement: 200MHz per beam

**Issue 2-1-2: NTN SAN SCS**

* Proposals
  + Option 1: In table 2.3.1-2 (R4-2309971), update SCS values for 400 MHz channel BW to 120 kHz and align HPBW values with the agreed values in section 2.4.1.
* Agreement: Option 1

**Issue 2-2: NTN SAN Antenna Pattern**

* Proposals
  + Option 1: Antenna pattern in section 6.4.1 of TR38.811
* The following normalized antenna gain pattern, corresponding to a typical reflector antenna with a circular aperture, is considered.

1

* where:

- J1(x) is the Bessel function of the first kind and first order with argument;

- x, is the radius of the antenna's circular aperture;

- k = 2f/c is the wave number;

- f is the frequency of operation;

- c is the speed of light in a vacuum and  is the angle measured from the bore sight of the antenna's main beam.

* Note that *ka* equals to the number of wavelengths on the circumference of the aperture and is independent of the operating frequency.
  + Option 2:
* Agreement: Reusing Antenna pattern in section 6.4.1 of TR38.811

**Issue 2-4-1: NTN SAN NF**

* Proposals
  + Option 1: 3.5dB
  + Option 2: 5.9dB
  + Option 3: To define 2 SAN classes with different NF valued
* Agreement:
  + For GEO: 3.5 dB
  + For LEO: For co-existence simulation purpose:
    - Option 1: 5.9 dB
    - Option 2: 3.5 dB

**Issue 2-4-2: NTN UE NF**

* Proposals
  + Option 1: 6dB
  + Option 2: 5.9dB
  + Option 3: 1.2dB or 2.1dB
  + Option 4: 4dB
  + Option 5: To start with higher NF value
  + Option 6: Use same NF value for both calibration and simulation
* Agreement
  + For NTN UE only supporting GEO:
    - 2.5 dB
  + For NTN UE supporting both GEO and LEO:
    - Option 1: 3.5 dB
    - Option 2: 6.0 dB

**R4-2313865 WF for NTN co-existence study**

*Type: other For: Approval  
 Source: Samsung, Cybercore*

**Decision: Approved.**

**Session chair note: For SAN NF assumption, aligned with SAN RF agreement as**

* GEO and LEO: 3.5 dB

**R4-2313890 Simulation assumption for NTN co-existence study**

*Type: other For: Approval  
 Source: Samsung*

**Decision: Approved.**

**R4-2313986 Collected calibration results for NTN co-existence study**

*Type: other For: Information  
 Source: Samsung*

**Decision: Noted.**

### 8.28 NR Network-controlled Repeaters

#### 8.28.1 General and work plan

**R4-2313178 draft spec skeleton for NCR**

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

**Decision: Noted.**

##### 8.28.1.1 System parameters

##### 8.28.1.2 Others

**R4-2311561 Discussion of updating RF diagrams**

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

**Decision: Noted.**

**R4-2311712 Discussion on RF diagrams for NCR**

*Type: discussion For: Approval  
 Source: NEC*

**Decision: Noted.**

**R4-2311643 Discussion on NCR feature list**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2313177 Discussion on RAN4 feature list for NCR-MT**

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

**Decision: Noted.**

#### 8.28.2 RF core requirements

##### 8.28.2.1 RF requirements for NCR-Fwd

**R4-2311562 Discussion of Spurious Emissions requirements for NCR-Fwd**

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

**Decision: Noted.**

**R4-2311635 Further discussion on RF requirements for NCR-Fwd**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2313006 NCR TX RF requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313179 Discussion on RF requirements for NCR-Fwd**

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

**Decision: Noted.**

##### 8.28.2.2 RF requirements for NCR-MT

**R4-2311157 RF requirement for LA NCR-MT**

*Type: discussion For: Discussion  
 Source: Murata Manufacturing Co Ltd.*

**Decision: Noted.**

**R4-2311563 Discussion of RF requirement for NCR-MT**

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

**Decision: Noted.**

**R4-2311564 Discussion of mixed type NCRs as part of conformance testing**

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

**Decision: Noted.**

**R4-2311636 Further discussion on RF requirements for NCR-MT**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2311713 Discussion on RF requirements for NCR-MT**

*Type: discussion For: Approval  
 Source: NEC*

**Decision: Noted.**

**R4-2313007 NCR RX RF requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313180 Discussion on RF requirements for NCR-MT**

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

**Decision: Noted.**

**R4-2313496 Further discussion on RF Requirements for NCR**

*Type: other For: Discussion  
 Source: Dell Technologies*

**Decision: Noted.**

#### 8.28.3 EMC core requirements

**R4-2311560 Discussion of EMC core requirements**

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

**Decision: Noted.**

**R4-2312051 Discussion on network controlled repeater EMC**

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

**Decision: Noted.**

#### 8.28.4 RF conformance testing

**R4-2311158 Discussion on necessity of spurious emissions test when considering mixed type for NCR**

*Type: discussion For: Discussion  
 Source: NTT DOCOMO, INC.*

**Decision: Noted.**

**R4-2311559 Test configurations for NCR repeaters**

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

**Decision: Noted.**

**R4-2311603 Further discussion on RF conformance testing for NCR**

*Type: other For: Approval  
 Source: CATT*

**Decision: Noted.**

**R4-2313008 NCR conformance considerations**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313181 Discussion on conformance testing requirement for NCR**

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

**Decision: Noted.**

#### 8.28.6 Demodulation performance requirements

**R4-2311515 Discussion on NCR-MT demodulation requirements**

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

**Decision: Noted.**

**R4-2311516 Simulation results for NCR-MT**

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

**Decision: Noted.**

**R4-2312802 [NR\_netcon\_repeater-Perf] NCR Demodulation Performance Requirements**

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

**Decision: Noted.**

**R4-2312803 [NR\_netcon\_repeater-Perf] Simulation Results on NCR PDSCH and PDCCH Demodulation Requirements**

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

**Decision: Noted.**

**R4-2313009 NCR-MT demodulation requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313660 Discussion on demodulation requirements for NR network-controlled repeaters**

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

**Decision: Noted.**

**R4-2313661 Simulation results on demodulation requirements for NR network-controlled repeaters**

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

**Decision: Noted.**

#### 8.28.7 Moderator summary and conclusions

**[108][312] NR\_netcon\_repeater\_RF, AI 8.28.1, 8.28.2, 8.28.3**

**R4-2314248 Topic summary for [108][312] NR\_netcon\_repeater\_RF**

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

**Decision: Noted.**

**Issue 1-1: draft spec skeleton**

* + Proposal 1: to discuss the draft spec skeleton for NCR [ZTE, [R4-2313178](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313178.zip)]
* Discussion
  + Nokia: This is for existing specification?
  + Ericsson: Some part related RRM need to discussed over RRM session.
  + ZTE: Our understanding is workable to add new sections.

**Issue 1-2: NCR-MT feature list**

* Proposals
  + Proposal 1: There’s no feature list for NCR-Fwd. [CATT, [R4-2311643](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311643.zip)]
  + Proposal 2: Table 1 can be taken as a starting point for further discussion of NCR-MT feature list. [CATT, [R4-2311643](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311643.zip)]
  + Proposal 3: not to define feature list for NCR-Fwd part; [ZTE, [R4-2313177](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313177.zip)]
  + Proposal 4: to further discuss the feature list for NCR-MT as proposed in section 3,4 and 5. [ZTE, [R4-2313177](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313177.zip)]
* Agreement:
  + There’s no feature list for NCR-Fwd

**Topic #3 NCR-MT requirements**

Issue 3-1-1 Transmitter ON-OFF power and transition period

* Proposals
  + Proposal 1: for Wide area NCR-MT transmitter ON-OFF power and transition period requirement, propose to reuse the Wide area IAB-MT requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: for Local area NCR-MT transmitter ON-OFF power and transition period requirement, propose to reuse the legacy UE requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 3: for LA NCR-MT transmitter ON-OFF power and transition period requirement, to reuse the legacy UE requirement as baseline. [Murata, [R4-2311157](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311157.zip)]
  + Proposal 4: Option 1: IAB-MT approach [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 5: For transmit ON-OFF power and transition period requirements, follow IAB-MT approach for WA NCR-MT and follow legacy UE approach for LA NCR-MT. [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)]
  + Proposal 6: It is suggested to reuse UE transmitter ON/OFF power and transition period requirement for NCR-MT. [Dell,[R4-2313496](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313496.zip)]
  + Proposal 7: Adopt the UE requirements for NCR-MT on/off transition time and FR2 OFF level [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 8: For the FR1 OFF level, consider a lower limit than in the UE specification, in particular WA. For example, based on -50dBm in 20MHz. [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 9: For transmitter ON/OFF power and transient period, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT. [CATT,R4-2311636]
* Agreement:
  + Proposal 1: for Wide area NCR-MT transmitter ON-OFF power and transition period requirement, propose to reuse the Wide area IAB-MT requirement.
  + Proposal 2: for Local area NCR-MT transmitter ON-OFF power and transition period requirement, propose to reuse the legacy UE requirement.

Issue 3-1-2 Transmitter unwanted emission requirement

* Proposals
  + Proposal 1: for Local area NCR-MT, propose to reuse legacy UE SEM requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: if the NCR supports simultaneous MT and FWD transmission, then LA NCR-MT OBUE/SEM requirement, to reuse IAB-MT approach. [Murata, [R4-2311157](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311157.zip)]
  + Proposal 3: Re-use same approach as for Local Area IAB-MT (TS 38.174 clause 6.6.4) [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 3: For LA NCR-MT OBUE/SEM requirements, follow Rel-17 repeater approach. [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)]
  + Proposal 4: For the Local Area class NCR-MT OBUE/SEM, it is reasonable to reuse UE SEM requirements. [Dell,[R4-2313496](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313496.zip)]
  + Proposal 5: Adopt the UE SEM for NCR-MT. [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 6: Apply the same emissions limits as for NCR-FWD in Rel-17 to the combined emissions from NCR-FWD and NCR-MT when transmitting simultaneously. [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 7: For operating band unwanted emissions, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT. For LA class, it is suggested to define OBUE requirements in IAB-MT approach, but the specific UE (PC2) value could be applied. [CATT,R4-2311636]
* Agreement:
  + For Local area NCR-MT which not support simultaneous MT and FWD transmission, reuse legacy UE SEM requirement.
  + FFS for the applicable requirements if the NCR supports simultaneous MT and FWD transmission

Issue 3-1-3 Transmitter spurious emission requirement

* Proposals
  + Proposal 1a: for Wide area NCR-MT transmitter spurious requirement, propose to reuse the legacy repeater uplink transmitter spurious emission requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 1b: for local area NCR-MT transmitter spurious requirement, propose to reuse the legacy UE transmitter spurious emission requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: For simultaneous and non-simultaneous transmission of NCR-MT and NCR-Fwd part in the uplink direction, it is suggested to reuse transmitter spurious emissions for FR1 repeater. [CATT,R4-2311636]
* Agreement:
  + For NCR-MT which not support simultaneous MT and FWD transmission
    - For Wide area NCR-MT transmitter spurious requirement, reuse the legacy repeater uplink transmitter spurious emission requirement.
    - For local area NCR-MT transmitter spurious requirement, reuse the legacy UE transmitter spurious emission requirement.
  + FFS for the applicable requirements if the NCR supports simultaneous MT and FWD transmission

Issue 3-1-4 Transmitter transmitter intermodulation

* Proposals
  + Proposal 1a: for Wide area NCR-MT transmitter intermodulation requirement, propose to reuse the Rel-16 IAB-MT intermodulation requirements. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 1b: for Local area NCR-MT transmitter intermodulation requirement, propose to reuse the Rel-16 IAB-MT intermodulation requirements. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: Option 1: IAB-MT approach. [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 3: For transmitter intermodulation requirements, follow corresponding approaches for ACLR, OBUE/SEM, and transmitter spurious emission requirements. [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)]
  + Proposal 4: Adopt the BS TX IM requirement for IAB-MT. Base the power level on the NCR-FWD output power. [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 5: For output intermodulation, the requirements for FR1 IAB-MT could be reused for Type 1-H NCR-MT; for FR1 Type 1-C NCR-MT, it is suggested to reuse the BS Type 1-C requirements. [CATT,R4-2311636]
* Discussion:
  + NEC: For local area NCR-MT, some cases reusing legacy UE requirements and some others not. Better to have consistent approach.
  + Ericsson: Interference level refer to IM level not refer to emission level. This NCR-MT is not UE.
  + NEC: For interference level we are fine the suggestion from Ercisson, for the requirements itself we should be consistent.
* Agreement:
  + For Wide area NCR-MT transmitter intermodulation requirement, reuse the Rel-16 IAB-MT intermodulation requirements.
  + For Local area NCR-MT transmitter intermodulation requirement, reuse the Rel-16 IAB-MT intermodulation requirements.
  + The IM level based on NCR-Fwd link
  + During test, NCR-MT need to pass corresponding SEM requirements and spurious emission requirements.

Issue 3-2-1 REFSENS requirement

* Proposals
  + **Proposal 1:** for Local area NCR-MT, to follow the legacy UE noise figure. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + **Proposal 2:** for 15kHz FRC of FR1 IAB-MT, propose to use the following FRC. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]

Table A1-1: FRC parameters for FR1 reference sensitivity level for NCR-MT.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A1-22 | G-FR1-A1-23 | G-FR1-A1-25 | G-FR1-A1-26 | G-FR1-A1-27 | G-FR1-A1-28 |
| Subcarrier spacing (kHz) | 30 | 60 | 30 | 60 | 15 | 15 |
| Allocated resource blocks | 11 | 11 | 51 | 24 | 25 | 106 |
| CP-OFDM Symbols per slot (Note 1) | 9 | 9 | 9 | 9 | 9 | 9 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| NOTE 1:   *DL-DMRS-config-type* = 1 with *DL-DMRS-max-len* = 1, *DL-DMRS-add-pos* = pos2 with = 2, = 6 and 9 as per Table 7.4.1.1.2-3 of TS 38.211 [3].  NOTE 2:   MCS index 4 and target coding rate = 308/1024 are adopted to calculate payload size for receiver sensitivity | | | | | | |

* + Proposal 3: Option1: 13dB [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 4: For LA NCR-MT NF assumption for REFSENS for FR1, adopt legacy UE value [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)]
  + Proposal 5: Adopt the UE reference sensitivity for LA NCR-MT. [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 6: The 13 dB Noise figure for FR1 LA IAB-MT could be reused for FR1 LA NCR-MT. [CATT,R4-2311636]
  + Proposal 7: It is suggested to use the revised Table 2-1 for FRC parameters below for FR1 NCR-MT REFSENS [CATT,R4-2311636]

Table 2-1: FRC parameters for FR1 reference sensitivity level for NCR-MT.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A1-21 | G-FR1-A1-22 | G-FR1-A1-23 | G-FR1-A1-24 | G-FR1-A1-25 | G-FR1-A1-26 |
| Subcarrier spacing (kHz) | 15 | 30 | 60 | 15 | 30 | 60 |
| Allocated resource blocks | 25 | 11 | 11 | 106 | 51 | 24 |
| CP-OFDM Symbols per slot (Note 1) | 9 | 9 | 9 | 9 | 9 | 9 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| NOTE 1:   *DL-DMRS-config-type* = 1 with *DL-DMRS-max-len* = 1, *DL-DMRS-add-pos* = pos2 with = 2, = 6 and 9 as per Table 7.4.1.1.2-3 of TS 38.211 [3].  NOTE 2:   MCS index 4 and target coding rate = 308/1024 are adopted to calculate payload size for receiver sensitivity | | | | | | |

* Discussion:
  + CATT: There is difference between BS and UE approach. Under UE side, diversity gain assumed.
  + Ericsson: We can keep test as per antenna connector.
* Agreement:
  + For LA NCR-MT: reusing legacy UE assumption on NF
  + Use the revised Table 2-1 for FRC parameters below for FR1 NCR-MT

Table 2-1: FRC parameters for FR1 reference sensitivity level for NCR-MT.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A1-21 | G-FR1-A1-22 | G-FR1-A1-23 | G-FR1-A1-24 | G-FR1-A1-25 | G-FR1-A1-26 |
| Subcarrier spacing (kHz) | 15 | 30 | 60 | 15 | 30 | 60 |
| Allocated resource blocks | 25 | 11 | 11 | 106 | 51 | 24 |
| CP-OFDM Symbols per slot (Note 1) | 9 | 9 | 9 | 9 | 9 | 9 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| NOTE 1:   *DL-DMRS-config-type* = 1 with *DL-DMRS-max-len* = 1, *DL-DMRS-add-pos* = pos2 with = 2, = 6 and 9 as per Table 7.4.1.1.2-3 of TS 38.211 [3].  NOTE 2:   MCS index 4 and target coding rate = 308/1024 are adopted to calculate payload size for receiver sensitivity | | | | | | |

Issue 3-2-2 ACS/IBB

* Proposals
  + Proposal 1: for Local area NCR-MT, propose to use the UE ACS requirement as 33dBc for FR1 NCR-MT and 23,22dBc for FR2 NCR-MT update the IAB-MT or BS requirement accordingly. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: for Local area NCR-MT IBB requirement, propose to follow the legacy UE requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 3:for LA NCR-MT ACS/IBB requirement, to reuse the legacy UE requirement as baseline. [Murata, [R4-2311157](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311157.zip)]
  + Proposal 4: Re-use same approach as for Local Area IAB-MT (TS 38.174 clause 7.4.1) [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 5: For LA NCR-MT ACS/IBB requirements, follow legacy UE approach [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)].
  + Proposal 6: It is proposed to reuse the UE ACE/IBB requirements for Local Area NCR-MT. [Dell,[R4-2313496](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313496.zip)]
  + Proposal 7: UE ACS can be used for the LA NCR-MT [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 8: For Adjacent Channel Selectivity, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT. [CATT,R4-2311636]
  + Proposal 9: The 5MHz channel bandwidth for ACS requirements should be supplemented in Table 2-2 and Table 2-3 below: [CATT,R4-2311636]
  + Proposal 10: For In-band blocking, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT. [CATT,R4-2311636]
  + Proposal 11: The 5MHz channel bandwidth for IBB requirements should be supplemented in Table 2-4, Table 2-5 and Table 2-6 below: [CATT,R4-2311636]
* Agreement
  + Proposal 1: for Local area NCR-MT use the UE ACS requirement
  + Proposal 2: for Local area NCR-MT IBB requirement, follow the legacy UE requirement

Issue 3-2-3 OOBB requirement

* Proposals
  + Proposal 1: for OOBB requirement for Local area NCR-MT, propose to follow the legacy UE requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: for LA NCR-MT OOBB requirement, to reuse the legacy UE requirement as baseline.[Murata, [R4-2311157](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311157.zip)]
  + Proposal 3: Reuse same approach as for out-of-band blocking requirements of IAB-MT (TS 38.174 clause 10.6) [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 4: For LA NCR-MT OOBB requirements, follow legacy UE approach [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)].
  + Proposal 5: It is suggested to reuse UE requirements for Local Area NCR-MT OOBB requirements. [Dell,[R4-2313496](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313496.zip)]
  + Proposal 6: It is OK to use the UE requirement for LA NCR-MT OOBB [Ericsson, [R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 7: For Out-of-band blocking, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT. [CATT,R4-2311636]
* Agreement:
  + For OOBB requirement for Local area NCR-MT, propose to follow the legacy UE requirement.

Issue 3-2-4 Receiver spurious emission requirements

* Proposals
  + Proposal 1a: for receiver spurious emission requirement for Wide area NCR-MT, propose to reuse the IAB-MT requirement for it. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 1b: for receiver spurious emission requirement for Local area NCR-MT, propose to reuse the legacy UE requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: For receiver spurious emissions, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT. [CATT,R4-2311636]
* Agreement:
  + For NCR-MT which not support simultaneous MT and FWD reception
    - Proposal 1a: for receiver spurious emission requirement for Wide area NCR-MT, propose to reuse the IAB-MT requirement for it.
    - Proposal 1b: for receiver spurious emission requirement for Local area NCR-MT, propose to reuse the legacy UE requirement.
  + FFS for the applicable requirements for NCR-MT which support simultaneous MT and FWD reception

Issue 3-2-5 Receiver intermodulation requirements

* Proposals
  + Proposal 1: for receiver intermodulation requirement for Local areas NCR-MT, propose to legacy UE requirement. [ZTE,[R4-2313180](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313180.zip)]
  + Proposal 2: Re-use same approach as for Local Area IAB-MT (TS 38.174 clause 7.7 and 10.8) [Nokia, [R4-2311564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311564.zip)]
  + Proposal 3: For LA NCR-MT receiver intermodulation requirements, follow legacy UE approach [NEC,[R4-2311713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2311713.zip)].
  + Proposal 4: Adopt the IAB/BS RX intermodulation requirement for the NCR-MT. [Ericsson,[R4-2313007](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_108/Docs/R4-2313007.zip)]
  + Proposal 5: For Receiver intermodulation, the requirement for FR1 IAB-MT could be reused for Type 1-C and Type 1-H NCR-MT [CATT,R4-2311636]
* Agreement:
  + For Local area NCR-MT Receiver intermodulation requirement, reuse legacy UE intermodulation requirements.

**Issue 4-1: Core part of NCR EMC**

* + Proposal 1: The modification of NCR EMC core part should focus on introducing the new concept of NCR type 1-H and 2-O.
  + Proposal 2: For NCR EMC, most of the core requirements are product agnostic, therefore majority jobs should be carried out in perf stage. In core stage, we should at least update NCR type 1-H and 2-O in clauses 1, 2 and 3.
  + Proposal 3: The RF diagrams for NCR in Figures 4-6 in R4-2311560 should take into consideration during the modification.
* Discussion:
  + Huawei: What’s the motivation of proposal 1?
  + ZTE: We have agreements EMC requirements is product agonistic.
* Agreement:’
  + Proposal 3 agreed

**R4-2313904 Ad-hoc minutes for NCR RF**

*Type: other For: Approval  
 Source: ZTE*

**Abstract:**

**Discussion:**

**Decision: Noted.**

**R4-2313903 WF for NCR RF requirements**

*Type: other For: Approval  
 Source: ZTE*

**Decision: Approved.**

**R4-2313905 WF for NCR EMC**

*Type: other For: Approval  
 Source: ZTE*

**Decision: Approved.**

**[108][313] NR\_netcon\_repeater\_RFConformance, AI 8.28.4**

**R4-2314249 Topic summary for [108][313] NR\_netcon\_repeater\_RFConformance**

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

**Decision: Noted.**

**Issue 1-1: Mixed type introduction**

* Proposals
  + Proposals in R4-2311158 (NTT DOCOMO, INC):
    - Mix type for NCR should be allowed for deployment scenario because the specification impact is only adding to Rx spurious emissions and the other requirements can be focused on the same NCR type.
  + Proposal in R4-2313008 (Ericsson)
    - [Only introduce mixed types if the need is really clear](file:///C:\Users\shanhuiping\AppData\Local\Temp\360zip$Temp\360$6\R4-2313008%20NCR%20conformance.docx#_Toc142654349)
* Discussion:
  + NTT DOCOMO: We should allow mixed types.
  + Ericsson: The spec will be complicated to consider mixed types which we think it’s not possible.
  + ZTE: We also tend to agree with Ericsson for spec complexity.
  + NEC: What’s the assumption of Mixed Types referred across FWD-BS/UE and MT part?
* Agreement:
  + FFS how to address conformance testing for mixed typce 1-C and 1-H.

**Issue 1-2: Simultaneous UL for NCR –Fwd and NCR-MT**

* Proposals
  + Proposal in R4-2311603 (CATT)
    - Manufacturer should declare whether NCR supporting NCR-Fwd and NCR-MT simultaneous transmission/recepetion
* Agreement:
  + Whether NCR supporting NCR-Fwd and NCR-MT simultaneous transmission is manufacture declaration basis.
  + Whether NCR supporting NCR-Fwd and NCR-MT simultaneous reception is manufacture declaration basis.

**Issue 1-3: the necessary control information of NCR-Fwd link**

* Proposals
  + Proposal in R4-2313181 (ZTE Corporation)
    - for the necessary control information of NCR-Fwd link, it could follow the BS approach together with C-link.
* Agreement:
  + For the necessary control information of NCR-Fwd link, leave it as TE’s implementation.

**Issue 2-2: NCR-MT measurement setup**

* Proposals
  + Proposal in R4-2313181 (ZTE)
    - Propose to use the existing measurement setup for Rel-16 IAB-MT as baseline for NCR-MT measurement setup and further consider the joint conformance testing setup for emission related requirement if necessary.
* Agreement: Use the existing measurement setup for Rel-16 IAB-MT as starting point for NCR-MT measurement setup

**Issue 3-1: Proposals in R4-2313008 (Ericsson)**

* Proposals
  + Proposal 1 For NCR-FWD DL testing, continue to use the test configurations already defined in 38.115.
  + Proposal 2 For NCR-MT RX testing, place a single NCR-MT carrier at the upper and lower edges of the RF bandwidth (in each band, if applicable).
  + Proposal 3 For the separate UL testing configurations, the proposals 1 and 2 can be used for NCR-FWD UL and NCR-MT TX.
  + Proposal 4 For joint testing, use the same test configurations as 38.115, but replace one of the NCR-FWD carriers with an NCR-MT carrier. Repeat with NCR-MT placed in each NCR-FWD carrier position.
* Discussion:
  + Nokia: P1 is fine, P2 is similar as Nokia’s proposal.
  + ZTE: We are fine with P1, P2 and P3.
* Agreement: Proposal 1, 2 and 3 agreed

**Issue 3-2: Proposals in R4-2311559 (Nokia)**

* Proposals
  + Proposal 1: It is proposed that conformance testing for the REFSENS requirement of the NCR-MT receiver is perform together with ACRR and Input IMD interfering signals.
  + Proposal 2: It is proposed to test the REFSENS requirement of NCR-MT receiver together with ACRR interfering signals together with the DL ACRR requirements for NCR-Fwd using presented test configurations in Figure 3 and 4.
* Discussion:
  + Ericsson: Proposal 2 pending on whether NCR support simultaneously operation.
  + ZTE: We need more time to discuss since the requirements still on discussion.

**R4-2313906 WF for NCR conformance testing**

*Type: other For: Approval  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**[108][328] NR\_netcon\_repeater\_Demod, AI 8.28.6**

**R4-2314264 Topic summary for [108][328] NR\_netcon\_repeater\_Demod**

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

**Decision: Noted.**

**R4-2313922 WF for NR\_netcon\_repeater\_Demod**

*Type: other For: Approval  
 Source: ZTE*

**Abstract:**

**Discussion:**

**Issue 1-2-1: Whether to define new requirements on PDCCH for signaling of Access link beam change indication**

* Proposals
  + Option 1: Yes. (Nokia)
    - Option 1A: RAN4 shall adapt test parameters for NCR PDCCH requirements following DCI format 5\_0/2\_8 at least to adapt the max payload size accordingly (i.e., 128 bits).
  + Option 2: No. (HW)
    - Option 2A: Reuse same DCI type from IAB-MT and legacy UE requirements for NCR PDCCH requirements.
* Discussion
  + Nokia: With DCI 5\_0/2\_8, high SNR required with large payload size.
  + Ericsson: We understand the performance difference but we can’t verify beam change indication function during demodulation test cases. We prefer to take option 2 here.
  + Huawei: We suggest to reuse existing test cases given no receiver processing difference.
  + Nokia: With larger payload size, we can observe the performance difference. We suggest to have more discussion for test feasibility.
  + ZTE: We have similar view as Ericsson and Huawei.
* Agreement: FFS whether new PDCCH requirements needed or not for DCI format 5\_0/2\_8 with large payload size.

**Issue 1-2-2: Test scope for PDCCH FR1**

* Proposals

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bandwidth (MHz) | CORESET RB | CORESET duration | Aggregation level | Propagation Condition | Antenna configuration and correlation Matrix |
| 10 | 48 | 1 | 8 | TDLA30-10 | 2x4 Low |

* Agreement:
  + Above table used for simulation purpose on the requirements with existing DCI if introduced.

**Issue 1-2-3: Test scope for PDCCH FR2**

* Proposals
  + Option 1: No new simulation is needed. (HW, ZTE)
* Agreement: NO new simulation for existing DCI , FFS for new DCI if introduced.

**Issue 1-3-1: Whether to define PMI requirements**

* Proposals
  + Option 1: Yes. (ZTE, HW)
    - * Testing of performance requirements for PMI reporting is optional. (HW)
  + Option 2: No. (Nokia)
* Discussion:
  + Nokia: We believe PMI not needed, considering deployment planning on NCR-MT.
  + Huawei: We would to follow IAB-MT approach, with declaration basis for testing. Different vendors may have different deployment plan.
  + Ericsson: We don’t have strong concern, meanwhile testing is optional is strange for us.
  + Nokia: The situation under IAB and NCR is different. NCR not decoding PDSCH from UE. NCR-MT only decode the control signal from NW.

**Issue 1-3-2: Test scope for CQI requirements**

* Proposals
  + Option 1: No new simulation is needed for FR1 and FR2. (HW)
* Agreement:
  + Reusing existing static CQI tests cases, no additional simulation needed.

**Issue 1-1-4: Test scope for PDSCH FR2**

* Agreements:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Case number | Bandwidth (MHz) | SCS (kHz) | Propagation condition | Antenna configuration | Test metric |
| 1 | 100 | 120 | TDLA30-75 | 2x2 | 70% max throughput  1% BLER |

**Decision: Revised to R4-2313923 (from R4-2313922).**

**R4-2313923 WF for NR\_netcon\_repeater\_Demod**

*Type: other For: Approval  
 Source: ZTE*

**Decision: Approved.**

### 8.33 Mobile IAB (Integrated Access and Backhaul) for NR

#### 8.33.1 General and work plan

#### 8.33.2 Co-existence study

**R4-2311558 Mobile IAB coexistence**

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

**Decision: Noted.**

**R4-2313218 Preliminary mobile IAB and NR coexistence study**

*Type: other For: Approval  
 Source: Qualcomm CDMA Technologies*

**Decision: Noted.**

**R4-2313473 Coexistence simulation results**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

#### 8.33.3 RF core requirements

**R4-2313474 On mIAB RF requriement**

*Type: other For: Approval  
 Source: Ericsson*

**Decision: Noted.**

**R4-2313497 Further discussion on mobile IAB RF requirements**

*Type: other For: Discussion  
 Source: Dell Technologies*

**Decision: Noted.**

#### 8.33.5 Moderator summary and conclusions

**[108][314] NR\_mobile\_IAB\_RF, AI 8.33.2, 8.33.3**

**R4-2314250 Topic summary for [108][314] NR\_mobile\_IAB\_RF**

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

**Decision: Noted.**

**R4-2313901 WF for Mobile IAB RF requirements and co-existence study**

*Type: other For: Approval  
 Source: Qualcomm*

**Decision: Approved.**

## 9 Rel-18 on-going work Items for LTE

### 9.3 New bands and BW allocation for 5G terrestrial broadcast - part 2

#### 9.3.4 BS RF requirements

**R4-2313083 Introduction of 5G broadcast UHF bands to 36.104**

*Type: CR For: Agreement  
 36.104 v18.2.0 CR-4979 rev Cat: B (Rel-18)  
  
 Source: Rohde & Schwarz, SWR, Qualcomm, EBU*

R&S: We have received offline comments from Huawei and Nokia, Ericsson.

**Decision: Revised to R4-2313909 (from R4-2313083).**

**R4-2313909 Introduction of 5G broadcast UHF bands to 36.104**

*Type: CR For: Agreement  
 36.104 v18.2.0 CR-4979 rev Cat: B (Rel-18)  
  
 Source: Rohde & Schwarz, SWR, Qualcomm, EBU, Nokia*

**Decision: Agreed.**

**R4-2313084 TP to TR 36.8xx: Addition of summary of emission requirements for 5G broadcast**

*Type: other For: Approval  
 Source: Rohde & Schwarz*

R&S: It’s for TR 36.972

**Decision: Endorsed.**

**R4-2313788 5G Broadcast basestation EVM**

*Type: other For: Approval  
 Source: Qualcomm Incorporated*

**Decision: Noted.**

#### 9.3.5 Moderator summary and conclusions

**[108][315] LTE\_terr\_bcast\_bands\_BSRF, AI 9.3.4**

**R4-2314251 Topic summary for [108][315] LTE\_terr\_bcast\_bands\_BSRF**

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

**Decision: Noted.**

**Issue 1-1: EVM vs. MER requirement for 5G broadcast**

* Proposals
  + Option 1: Use EVM only
  + Option 2: Replace EVM with MER
  + Option 3: Add MER on top of EVM
* Agreement
  + Option 1

**Issue 1-2: Window length parameters**

* Proposals
  + Option 1: Use the 10 MHz channel bandwidth window length parameters for 5G broadcast configured with pmch-Bandwidth of 6, 7, and 8 MHz.
  + Option 2: Other
* Agreement
  + Option 1 agreed

## 10 Liaison and output to other groups

#### 10.2.3 Others

**Response LS to RAN5 on NTN clarification**

**R4-2311688 Discussion on LS response to RAN5 on clarifications for Non-Terrestrial Networks**

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

**Decision: Noted.**

**R4-2311767 NTN Doppler handling**

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

**Decision: Noted.**

**R4-2312369 Discussion on RAN5 LS to RAN4 - R5-233672 LS on clarifications for Non-Terrestrial Networks**

*Type: discussion For: Discussion  
 Source: THALES*

**Decision: Noted.**

**R4-2313262 Views on RAN5 LS on clarifications for Non-Terrestrial Networks**

*Type: other For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2313372 On the reply to LS R5-233672**

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

**Decision: Noted.**

**R4-2313489 Discussion on the reply LS to RAN5 on NTN clarifications**

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

**Decision: Noted.**

**R4-2313635 Clarifications for Non-Terrestrial Networks LS response to RAN5**

*Type: discussion For: Discussion  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Noted.**

**R4-2313640 Reply LS on clarifications for Non-Terrestrial Networks**

*Type: LS out For: Approval  
 to RAN5  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Revised to R4-2313862 (from R4-2313640).**

**R4-2313862 Reply LS on clarifications for Non-Terrestrial Networks**

*Type: LS out For: Approval  
 to RAN5  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Revised to R4-2314001 (from R4-2313862).**

**R4-2314001 Reply LS on clarifications for Non-Terrestrial Networks**

*Type: LS out For: Approval  
 to RAN5  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Approved.**

**R4-2313636 Clarifications to 38.101-5 (Rel-17)**

*Type: CR For: Agreement  
 38.101-5 v17.4.0 CR-0034 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Revised to R4-2314929 (from R4-2313636).**

**R4-2314929 Clarifications to 38.101-5 (Rel-17)**

*Type: CR For: Agreement  
 38.101-5 v17.4.0 CR-0034 rev Cat: F (Rel-17)  
  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Agreed.**

**R4-2313637 Clarifications to 38.101-5 (Rel-18)**

*Type: CR For: Agreement  
 38.101-5 v18.2.0 CR-0035 rev Cat: A (Rel-18)  
  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Agreed.**

**R4-2313638 Clarifications to 36.102**

*Type: CR For: Agreement  
 36.102 v18.2.0 CR-0019 rev Cat: F (Rel-18)  
  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Revised to R4-2314930 (from R4-2313638).**

**R4-2314930 Clarifications to 36.102**

*Type: CR For: Agreement  
 36.102 v18.2.0 CR-0019 rev Cat: F (Rel-18)  
  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Agreed.**

**R4-2313639 New Annex B.8 definition for High level test procedure for SAN RRM tests**

*Type: CR For: Agreement  
 36.133 v18.2.0 CR-7246 rev Cat: F (Rel-18)  
  
 Source: Keysight Technologies UK Ltd, THALES*

**Decision: Agreed.**

### 10.4 Moderator summary and conclusion

**[108][332] LS\_NTN\_R5-233672, AI 10.2.3 (R4-2311688, R4-2311767 , R4-2313262,R4-2313372, R4-2313489 , R4-2313635 R4-2313636, R4-2313637, R4-2313638, R4-2313639 R4-2313640)**

**R4-2314268 Topic summary for [108][332] LS\_NTN\_R5-233672**

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

**Discussion:**

**Decision: Noted.**

**Issue 1-1-1:** GSO & GEO **(GEO is a particular subset of GSO)**

* Proposals
  + Option 1: **Replace GSO with GEO in TS 38.133**, if companies insist to test zero-Doppler and/or zero-time variant conditions for this particular case.
* Discussion
  + Inmarsat: Even with GEO, zero-Doppler and/or zero-time variant conditions not really exist. We encourage companies to consider more realistic scenarios.
  + R&S: We need to focus on the LS from RAN5.
  + Thales: First we need to clarify the requirements assumption for NTN in RAN4. We also would like to differentiate NTN UE and TN UE.
  + Huawei: For GEO, if consider variable doppler shift; does that mean zero-doppler condition specified in RAN4 not testable for RAN5?
  + R&S: In current RAN5 specification, all TN test with zero-doppler.
  + MTK: For RRM requirements, different cases may have different side conditions. It’s better to focus on LS.
  + Apple: The side conditions on RRM, RF and demodulation requirements can be different, it’s better to focus on RAN5 LS.

**Issue 2-1-1: Q1a:** Are all the section 6 and section 7 RF Tx/Rx requirements defined in TS 38.101-5 applicable to both GSO and NGSO?

* Proposals
  + Option 1: **Yes.** Requirements defined in section 6 and 7 in TS 38.101-5 are applicable to both GSO and NGSO. ~~In case UE supports both types of satellites worst case requirements testing (NGSO) could suffice to demonstrate requirements compliance for both types of satellites for all the requirements.~~ Same applies to requirements defined in section 6 and 7 in TS 36.102. (Keysight Technologies UK Ltd, THALES, MediaTek, Qualcomm, Apple, Huawei)
    - **Note:** It is RAN4 assumption that the requirements still apply to both GSO and NGSO unless otherwise stated, this applies to both 38.101-5 and 36.102. See specific answers below on Frequency Error.
* Agreement:
  + **Yes.** Requirements defined in section 6 and 7 in TS 38.101-5 are applicable to both GSO and NGSO. Same applies to requirements defined in section 6 and 7 in TS 36.102.
    - **Note:** It is RAN4 assumption that the requirements still apply to both GSO and NGSO unless otherwise stated, this applies to both 38.101-5 and 36.102.

**Issue 2-1-2: Q1b:** Are there any NR NTN demod performance requirements applicable to GSO (even if not defined in TS 38.101-5)?

* Proposals
  + Option 1: Legacy requirements defined in TS 38.101-4 sections 5 and 6 **are applicable to both GSO and NGSO satellites**. (Keysight Technologies UK Ltd, THALES)
  + Option 2: Legacy demod performance requirement in 38.101-4/36.101 **are applicable to GSO**. GSO-only UE is only required to be tested requirements in 38.101-4/36.101 if applicable. (MediaTek)
  + Option 3: Current NR NTN demod performance requirements only apply for NGSO. **There is no demod performance requirement applicable to GSO.** (Apple)
* Agreement:
  + Current NR NTN demodulation performance requirements only apply for NGSO.
* Tentative agreement: [The legacy demodulation specified in TS 38.101-4 also applicable for both GSO and NGSO.]

**Issue 2-2-2: Q2b:** Under the zero Doppler conditions defined in section 6/7 of TS 38.101-5 and TS 36.102, what are RAN4 assumptions for UE Doppler and delay pre-compensation mechanisms for conformance testing: activated or deactivated?

* Proposals: (Keysight)
  + Option 1: For all types of satellites, the assumptions are that:
    - Doppler pre-compensation mechanism is deactivated
    - Delay pre-compensation mechanism only compensates for a constant delay

To be noticed that these assumptions are not strictly required for GEO satellites.

* + Option 2: Based on the above responses, RAN4 expects UE precompensation mechanisms to be deactivated for conformance testing, other than for Frequency Error requirements verification where we provide a specific response below. (MediaTek)
  + Option 3: Depends on implementation. Note: Question seems to imply there is an external mechanism to activate/deactivate pre-compensation. (Qualcomm)
  + Option 4: Activated (Apple, Nokia, Nokia Shanghai Bell) – because UE **cannot** turn off the pre-compensation.
* Agreement:
  + Except FOE requirements, all other RF requirements specified in section 6/7 of TS 38.101-5 and TS 36.102 are specified under the assumption the zero Doppler conditions.

**Issue 2-2-3: Q2c:** Are the zero Doppler or time varying assumptions applicable for conformance testing of RRM test cases in TS 38.133 Annex A.14 and in TS 36.133 Annexes A.13 and A.14?

* Proposals
  + Option 1: NO. **Zero Doppler conditions are not applicable to RRM test cases in TS 38.133 Annex A.14 and in TS 36.133 Annexes A.13 and A.14.** (Keysight, THALES, Nokia, Nokia Shanghai Bell, Huawei)
  + Option 2: At this moment, RAN4 has not yet introduced Ephemeris data to derive non-zero or time-varying Doppler shift. Besides, current AWGN without Doppler shift has been used in the most of test cases. **RAN4 view is that it is not needed to emulate Doppler shift or time delay variations.** (MediaTek)
  + Option 3: Yes (Apple).
* Agreement:
  + NO. At least for NGSO, **Zero Doppler conditions are not applicable to RRM test cases in TS 38.133 Annex A.14 and in TS 36.133 Annexes A.13 and A.14.**

**Issue 2-2-4: Q2d:** Are the zero Doppler or time varying assumptions applicable for conformance testing of demod performance requirements in section 8 in TS 38.101-5 and 36.102?

* Proposals
  + Option 1: Zero Doppler conditions related to satellite motion for DL in service link are applicable to demodulation or CSI reporting test cases in section 8 in TS 38.101-5 and TS 36.102. However, Doppler related to terrestrial model based on TR 38.901 is not zero. (Keysight)
  + Option 2: The frequency drift is not considered in the current demod performance requirements in section 8 of TS 38.101-5 and 36.102. (MediaTek)
  + Option 3: Zero Doppler (Apple)
* Agreement:
  + Zero Doppler conditions related to satellite motion for DL in service link are applicable to demodulation cases in section 8 in TS 38.101-5 and TS 36.102. However, demodulation requirements are specified with TDL channel model which implemented certain Doppler shift into channel model.

**R4-2313987 WF for LS to RAN5 on NTN testing**

*Type: other For: Approval  
 Source: Thales*

**Discussion:**

**Decision: Noted.**

Session chair: This WF can be considered as reference for RAN4 further study on NTN testing issues.