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

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

**Third Generation Partnership Project (3GPP™)**

**DRAFT Meeting Report  
for  
TSG RAN WG4  
meeting: 104-bis-e**

**Electronic Meeting, Online, 10/10/2022 to 19/10/2022**

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3.1 Incoming liaison statement

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**R4-22xxxxx RAN4#104-e RRM session chair notes**

*Type: report For: endorsement  
 Source: RAN4 Chair*

**Decision: Return to.**

RRM session email thread list

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI covered in the email thread** | **Moderator & Summary agenda** |
| [104-bis-e][200] RRM\_Session | N.A | N.A | N.A | Meng Zhang AI 3.2 |
| [104-bis-e][201] NR\_NTN\_solutions\_RRM\_1 | R17 NR NTN (NR\_NTN\_solutions) | RRM Core requirements maintenance | 4.2.5 | CH Park AI 4.2.8 |
| [104-bis-e][202] NR\_NTN\_solutions\_RRM\_2 | R17 NR NTN (NR\_NTN\_solutions) | RRM Perf requirements | 4.2.6 | Xuhua Tao AI 4.2.8 |
| [104-bis-e][203] NR\_ext\_to\_71GHz\_RRM\_1 | R17 NR 52.6 - 71GHz (NR\_ext\_to\_71GHz) | RRM Core requirements maintenance | 4.3.5 | Zhongyi Shen AI 4.3.8 |
| [104-bis-e][204] NR\_ext\_to\_71GHz\_RRM\_2 | R17 NR 52.6 - 71GHz (NR\_ext\_to\_71GHz) | RRM Perf requirements | 4.3.6 | Prashant Sharma AI 4.3.8 |
| [104-bis-e][205] NR\_feMIMO\_RRM\_1 | R17 NR feMIMO (NR\_feMIMO) | RRM Core requirement maintenance | 4.5.1 | Hua Li AI 4.5.4 |
| [104-bis-e][206] NR\_feMIMO\_RRM\_2 | R17 NR feMIMO (NR\_feMIMO) | RRM perf requirements | 4.5.2 | Yanze Fu (yanze.fu@samsung.com AI 4.5.4 |
| [104-bis-e][207] NR\_redcap\_RRM\_1 | R17 NR RedCap (NR\_redcap) | RRM Core requirements  RRM perf requirements | 4.6.3 4.6.3.1 4.6.4 | Santhan Thangarasa AI 4.6.6 |
| [104-bis-e][208] NR\_redcap\_RRM\_2 | R17 NR RedCap (NR\_redcap) | RRM Core requirements maintenance  - Extended DRX enhancements  - RRM measurement relaxations  - Others | 4.6.3.2 4.6.3.3 4.6.3.4 | Xusheng Wei AI 4.6.6 |
| [104-bis-e][209] NR\_IIOT\_URLLC\_enh | R17 NR IIoT/URLLC (NR\_IIOT\_URLLC\_enh) | RRM Core requirements  RRM Perf requirements | 4.7.1 4.7.2 | Lars Dalsgaard AI 4.7.4 |
| [104-bis-e][210] NR\_SmallData\_INACTIVE | R17 NR small data transmissions in INACTIVE state (NR\_SmallData\_INACTIVE) | RRM Core requirements  RRM Perf requirements | 4.8 | Aijun Cao AI 4.8.3 |
| [104-bis-e][211] FR2\_multiRx\_RRM\_part1 | R18 NR FR2 multi-Rx chain DL reception | RRM Core requirements for simultaneous DL Rx  -General  -Analysis of RRM impact  -L3 measurement | 6.8.3 6.8.3.1 6.8.3.2 | Qian Yang AI 6.8.4 |
| [104-bis-e][212] FR2\_multiRx\_RRM\_part2 | R18 NR FR2 multi-Rx chain DL reception | RRM Core requirements for simultaneous DL Rx  -L1 measurement | 6.8.3.3 | Valentin Gheorghiu AI 6.8.4 |
| [104-bis-e][213] FR2\_multiRx\_RRM\_part3 | R18 NR FR2 multi-Rx chain DL reception | RRM Core requirements for simultaneous DL Rx  -TCI state switching | 6.8.3.4 | Venkatarao Gonuguntla AI 6.8.4 |
| [104-bis-e][214] NR\_RRM\_enh3\_part1 | R18 Even Further RRM enhancement for NR and MR-DC | RRM Core requirements  -FR2 Scell activation delay reduction | 6.9 6.9.1 6.9.2 | Jerry Cui AI 6.9.4 |
| [104-bis-e][215] NR\_RRM\_enh3\_part2 | R18 Even Further RRM enhancement for NR and MR-DC | RRM Core requirements  -FR1-FR1 DC | 6.9.3 | Roy Hu AI 6.9.4 |
| [104-bis-e][216] NR\_MG\_enh2\_part1 | R18 Further enhancements on NR and MR-DC measurement gaps and measurements without gaps | RRM Core requirements  -pre-configured MGs, multiple concurrenet MGs, NCSG | 6.10 6.10.2 | Ato Yu AI 6.10.4 |
| [104-bis-e][217] NR\_MG\_enh2\_part2 | R18 Further enhancements on NR and MR-DC measurement gaps and measurements without gaps | RRM Core requirements  -without gaps | 6.10.3 | Rui Huang AI 6.10.4 |
| [104-bis-e][218] NR\_HST\_FR2\_enh\_RRM | R18 Enhanced NR support for high speed train scenario in frequency range 2 | RRM Core requirements | 6.12.4 6.12.5 | He (Jackson) Wang AI 6.12.6 |
| [104-bis-e][219] NR\_ATG\_RRM | R18 Air-to-ground network | RRM core requirements | 6.13.5 | Shiyuan Wang AI 6.13.6 |
| [104-bis-e][220] FS\_NR\_pos\_enh2\_RRM | R18 Study on expanded and improved NR positioning | RRM core requirements | 6.18.4 | Muhammad Kazmi AI 6.18.5 |
| [104-bis-e][221] NR\_MC\_enh\_RRM | R18 Multi-carrier enhancements for NR | RRM core requirements | 6.19.3 | Jing Han AI 6.19.4 |
| [104-bis-e][222] NR\_Mob\_enh2\_part1 | R18 further mobility enhancement | RRM core requirements  -L1/L2 based inter-cell mobility | 6.20 6.20.3 | Miao WANG AI 6.20.5 |
| [104-bis-e][223] NR\_Mob\_enh2\_part2 | R18 further mobility enhancement | RRM core requirements  -Study of improvement on FR2 SCell/SCG setup/resume | 6.20.2 | Qiming Li AI 6.20.5 |
| [104-bis-e][224] NR\_DualTxRx\_MUSIM | R18 MUSIM | RRM core requirements | 6.21 | Xusheng Wei AI 6.21.3 |
| [104-bis-e][225] NR\_netcon\_repeater\_RRM | R18 NR Network-controlled Repeaters | RRM Core requirements | 6.24.3 | Aijun Cao AI 6.24.4 |
| [104-bis-e][226] LTE\_NBeMTC\_NTN\_RRM | R18 NB-IoT/eMTC core & perf. requirements for NTN | RRM core requirements  UL Segmented Transmission for UL synchronization for IoT NTN (R1-2205642) | 7.5.6  8.2.1 | Hsuanli Lin AI 7.5.7 |
| [104-bis-e][227] LS\_reply |  | Time difference for MIMO with two TAs (R1-2205593) | 8.1.1 | Yuexia Song AI 8.4 |
| [104-bis-e][228] RAN\_task\_RRM |  | Analysis of options for BWP withoutRestriction | 9.1 | Qian Yang AI 9 |

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

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

4.2.5 RRM core requirement maintenance

**R4-2215448 Discussion on the remaining issues for NTN RRM**

*Type: discussion For: Discussion  
 Source: Xiaomi, CAICT*

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

**R4-2215500 CR on correction to cell re-selection requirement for satellite access**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2593 rev Cat: F (Rel-17)  
  
 Source: CMCC*

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

4.2.5.1 Measurement procedure requirements

**R4-2215391 Discussion on fully overlapping concurrent MGs for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215603 On measurement procedure for NTN UE**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Apple*

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

**R4-2215604 CR on intra-frequency and inter-frequency measurement requirement without MG for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2598 rev Cat: F (Rel-17)  
  
 Source: Apple*

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

**R4-2215749 CR on intra-frequency measurements in NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2602 rev Cat: F (Rel-17)  
  
 Source: Samsung*

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

**R4-2215751 Discussion on measurement procedure requirements in NTN**

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

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

**R4-2216315 On remaining issues for NTN measurement requirements**

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

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

**R4-2216316 CR on RLM and BFR requirements for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2624 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216317 CR on MG requirements for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2625 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216463 CR for Cell Reselection requirements with distance trigger**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2634 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216472 Discussion on Colliding Measurement Gaps**

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

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

**R4-2216502 CR on intra-frequency measurements for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2637 rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

CR on intra-frequency measurements for NTN

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

**R4-2216504 Measurement requirements for NTN**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Measurement requirements for NTN

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

4.2.5.2 Others

**R4-2215395 Completing requirements for conditional handover for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2590 rev Cat: F (Rel-17)  
  
 Source: CATT*

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

**R4-2215431 CR on cell re-selection, MDT and timing requirements for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2604 rev Cat: F (Rel-17)  
  
 Source: CATT*

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

**R4-2215582 CR on scheduling restrictions for L3 measurements in FR1 for NTN**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2594 rev Cat: F (Rel-17)  
  
 Source: Apple*

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

**R4-2215605 Reply LS on measurement gap enhancements for NTN**

*Type: LS out For: Agreement  
 to RAN2  
 Source: Apple*

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

**R4-2215748 CR on intra-frequency cell reselection in NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2601 rev Cat: F (Rel-17)  
  
 Source: Samsung*

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

**R4-2216312 Discussion on other requirements for NTN RRM**

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

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

**R4-2216313 CR on RRC re-establishment requirements for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2622 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216314 CR on UL spatial relation switch requirements for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2623 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216464 Editorial CR To TS 38.133 Handover requirements**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2635 rev Cat: D (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216467 Transmit Timing Aspects for NTN RRM**

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

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

**R4-2216592 Editorial CR To TS 38.133 Handover requirements**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2641 rev Cat: D (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

4.2.6 RRM performance requirements

4.2.6.1 General

**R4-2215449 Discussion on the performance requirements for NTN RRM**

*Type: discussion For: Discussion  
 Source: Xiaomi, CAICT*

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

**R4-2215501 Discussion on RRM test cases for NTN**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215752 Discussion on RRM performance for NR NTN**

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

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

**R4-2215819 Discussion on general RRM performance requirements for NR NTN**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: OPPO*

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

**R4-2216318 Discussion on measurement accuracy and TCs for NTN**

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

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

**R4-2216319 CR on measurement accuracy requirements for NTN**

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

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

**R4-2216863 draft CR of BWP switch and CBW change test cases for NR NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

**R4-2216868 Open Issues in NTN RRM Test Case Design**

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

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

4.2.6.2 Test cases for Cell reselection to intra- and inter-frequency neighbor cell

**R4-2215936 Draft CR on test case for cell reselection to FR1 inter-frequency NR cell for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: LG Electronics UK*

**Abstract:**

The test cases for inter-frequency cell reselection for satellite access are introduced in TS 38.133 since the inter-frequency cell reselection requirement has been specified.

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

**R4-2216320 Discussion on cell reselection test for NTN**

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

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

**R4-2216321 CR on cell reselection TCs for NTN**

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

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

**R4-2216471 Amendments on cell reselection parameters when not using enhanced mode**

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

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

4.2.6.3 Test cases for Intra- and inter-frequency HO with known cell

**R4-2215393 Test cases for Intra- and inter-frequency HO with known cell for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2588 rev Cat: F (Rel-17)  
  
 Source: CATT*

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

**R4-2215454 4-step RA type randon access test for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi, CAICT*

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

**R4-2216322 CR on TCs for RRC Re-establishment for NTN**

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

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

**R4-2216465 Discussion on configuration of HO aspects for NTN**

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

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

4.2.6.4 Test cases for Intra- and inter-frequency CHO

**R4-2215392 Discussion on test cases for handover for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215394 Test cases for Intra- and inter-frequency CHO for NTN**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2589 rev Cat: F (Rel-17)  
  
 Source: CATT*

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

**R4-2215452 RRC connection release with redirection rest for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi, CAICT*

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

**R4-2216466 Discussion on configuration of CHO aspects for NTN**

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

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

4.2.6.5 Test cases for UE transmit timing

**R4-2215502 draft CR for NTN timing advance adjustment accuracy test**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

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

**R4-2216278 Discussion on remaining issues on test cases for NTN UE timing**

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

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

**R4-2216279 DraftCR on UE transmit timing tests for NTN**

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

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

**R4-2216470 Discussion on open issues for timing advance**

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

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

4.2.6.6 Test cases for RLM and BFR

**R4-2215451 Pathloss reference signal switching delay test for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi, CAICT*

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

**R4-2215503 draft CR for CSI-RS based RLM for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

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

**R4-2216503 draft CR on test cases of BFD and LR for SA**

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

**Abstract:**

draft CR on test cases of BFD and LR for SA

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

4.2.6.7 Test cases for Intra-frequency measurement delay

**R4-2215820 CR to Test case 10-4 to 10-9 intra-frequency measurement delay with gap for satellite access**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2607 rev Cat: B (Rel-17)  
  
 Source: OPPO*

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

**R4-2216323 Discussion on measurement delay TCs for NTN**

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

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

**R4-2216324 CR on TCs for intra-frequency measurement delay for NTN**

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

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

4.2.6.8 Test cases for Inter-frequency measurement delay

**R4-2215455 Test case for inter-frequency measurement without gap for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi, CAICT*

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

4.2.6.9 Teste cases for L1-RSRP measurement delay

**R4-2215450 L1-RSRP measurement accuracy test for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi, CAICT*

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

4.2.6.10 Test cases for RRM measurement accuracy

**R4-2215453 SS-SINR measurement accuracy test for satellite access**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi, CAICT*

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

**R4-2216325 CR on general requirement for NTN RRM test cases**

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

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

4.2.8 Moderator summary and conclusions

**[104-bis-e][201] NR\_NTN\_solutions\_RRM\_1, AI 4.2.5 – CH Park**

**R4-2216912 Email discussion summary for [104-bis-e][201] NR\_NTN\_solutions\_RRM\_1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-12**

***Core maintenance***

**Issue 1 Fully Overlapping Concurrent MGs**

* Background

Agreements from the last meeting:

* Option 1: Do not define requirements for fully overlapping concurrent MGs
* Option 2: For fully overlapped case, gap sharing rule is applied during the collided gap occasions, and the scaling factor is 2
  + Option 2A:
    - It is applicable only to the case where both of the concurrent MGs have the longest MGRP, i.e. 160ms.
    - A MG with the lowest ID, i.e. 0, gets priority over the other, and the dropping rule starts from SFN=0, i.e. MG-ID#0 is selected and MG-ID#1 is dropped at the first collision instance after SFN=0, and it alternates afterwards.
    - [RAN4 introduce a new UE capability supporting “fully overlapping concurrent MGs” which is limited to NTN-only.]
  + Option 2B:
    - It is applicable only to the case where both of the concurrent MGs have the longest MGRP, i.e. 160ms.
    - RAN4 introduce a new UE capability supporting “fully overlapping concurrent MGs” which is limited to NTN-only.
  + Option 2C:
    - It is applicable only to the case where both of the concurrent MGs have the longest MGRP, i.e. 160ms.
* Proposals
  + Proposal 1: CATT (R4-2215391)
    - Do not define requirements for fully overlapping concurrent MGs
  + Proposal 2: For fully overlapped case, gap sharing rule is applied during the collided gap occasions only when both of the concurrent MGs have the longest MGRP, i.e. 160ms., and the scaling factor is 2.
    - Proposal 2A: Xiaomi/CAICT (R4-2215448), Apple (R4-2215603), MediaTek (R4-2215751), Huawei/HiSilicon (R4-2216315), Nokia (R4-2216472)
      * A selection of measurement gap between the two is left to UE implementation, i.e. a union of the two measurement gaps including slots in between the two, if any, is considered as one measurement gap while the UE is not required to perform measurements using the both measurement gaps.
    - Proposal 2B: Ericsson (R4-2216504)
      * A MG with the lowest ID, i.e. 0, gets priority over the other, and the dropping rule starts from SFN=0, i.e. MG-ID#0 is selected and MG-ID#1 is dropped at the first collision instance after SFN=0, and it alternates afterwards.

**Discussion:**

Qualcomm: a question on 2A: fully collided MGs and the MGRP is 160ms, network configures one with 160ms and the other one also 160ms. The UE uses two gaps and during the gaps there is no scheduling. 12ms out of 160ms is gone. If 2A is agreed, the network does not know which pattern the UE uses. So network avoids schedule in both gaps and the loss is more. 2A is like a new pattern with long MGL.

Apple: we need to check whether the network has 160ms+160ms configuration? I think so. So what does the UE do? The UE chooses one from the two. There is no consensus on the pattern design. We don’t have much time left for this discussion. We leave this pattern selection to UE implementation. We are open to discuss the enahcnemnte for network to understand the UE selection.

Ericsson: we agree with Apple. We can accept proposal 2A as a compromise.

CATT: to clarify for 2A: it is only for both gaps are 160ms MGRP, what are the status of other cases? Selection is up to UE implementation is ok. But a nunion of the two measurement gaps…. Is not reasonable to us currently.

Qualcomm: 2B solves the concern from the network side but it is too late to introduce signaling so it is fixed pattern. It is not difficult at all.

**[104-bis-e][202] NR\_NTN\_solutions\_RRM\_2, AI 4.2.6 – Xuhua Tao**

**R4-2216913 Email discussion summary for [104-bis-e][202] NR\_NTN\_solutions\_RRM\_2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-12**

***Performance: Issues related to measurement accuracy requirements***

**Issue 1-1: Measurement accuracy**

* Proposals
  + Option 1: (Xiaomi)
    - 0.5dB is relaxed based on existing SS-RSRP accuracy requirements for NTN measurement.
  + Option 2: (MTK, Huawei)
    - Reuse the legacy TN measurement accuracy requirements for NTN.

**Discussion:**

Apple: we’d like to ask the relation between model and accuracy. Should we add side condition to apply any accuracy? How do we correspond propagation model error to inaccuracy?

Qualcomm: we do not see much issue on existing accuracy requirements. Option 2 is acceptable.

Nokia: we agree with Qualcomm. The reference model is not agreed yet. At this moment there is no reason to change.

MediaTek: we also agree with Qualcomm. Impact on the accuracy is limited. The timing error is less 6% of CP.

**Agreement:**

* Reuse the legacy TN measurement accuracy requirements for NTN.
  + Add brackets to the numbers

***Performance: Issues related to Test cases design***

**Issue 2-2: Serving and Neighbour Satellite configurations**

* Proposals
  + Option 1: (Huawei)
    - RAN4 to define a reference motion trajectory for the virtual satellite, and then generate ephemeris information based on the reference motion trajectory. Inputs from satellite system vendors and test equipment vendors are needed.
    - The TE should adjust its transmit timing and frequency based on the reference motion trajectory. The transmit power is adjusted as specified in the test case.

**Discussion:**

Qualcomm: not sure if this is RAN4 work.

Nokia: it is a test configuration. It is not part of the requriements, but the configuration used to generate the tests.

Huawei: the reference is definitely needed. We can consider to specify the configurations either in RAN4 or RAN5. We welcome input from satellite vendors.

Qualcomm: it maybe difficult to have input from satellite vendors. We could make reference in RAN4 for the trajectory so RAN5 can take reference.

Session chair: we could add a subclause in Annex to generate the reference for the motion trajectory for the virtual satellite used in the test cases.

**Agreement:**

**Issue 3-1: SMTC setup and scaling factor K\_multi in cell reselection tests.**

* Proposals
* Option 1: (CMCC)
  + At least to introduce the test case of ‘NGSO, two SMTC configured, SMTC partially overlap with each other, 2 satellites measured on 2 SMTC separately’ with scaling factor K\_multi\_SMTC
    - the length of T2 and T3 and the cell re-selection delay requirements should be multiplied by K\_multi\_SMTC = 2
  + The test case of ‘NGSO, one SMTC configured, 2 satellites measured on 1 SMTC’ could be also introduced with scaling factor K\_multi\_SMTC
    - the length of T2 and T3 should be multiplied by K\_multi\_SMTC = 2
    - The test requirement should be defined according to UE capability. For UE don’t support parallel measurements on more than 1 NGSO satellites within a SMTC, the cell re-selection delay to a newly detectable cell and an already detected cell should be multiplied by K\_multi\_SMTC. Otherwise, the current test requirement could be reused.
* Option 2: (Huawei)
  + Use the following SMTC configurations for TC 1-1 – 1-4.
    - TC 1-1: serving cell in SMTC1, neighbor cell in SMTC2, SMTC1 and SMTC2 non-overlapping
    - TC 1-2: serving cell in SMTC1, neighbor cell in SMTC2, SMTC1 and SMTC2 overlapping
    - TC 1-3 and 1-4: serving cell in SMTC1, neighbor cell in SMTC1
    - Scaling factor “K\_multi” is taken into account in the testing requirement for TC 1-1 – 1-4.
  + Use the same SMTC configuration as in A.6.1.1.2 for TC 1-5- 1-8, and scaling factor “K\_multi” is not taken into account in the testing requirement.

**Discussion:**

CMCC: we are fine to go with option 2. If we use option 2 for test cases 1-3 and 4 the requirements should be based on UE capability: parallel measurements on more than one NGSO satellite within one SMTC.

Ericsson: regarding parallel measurements does it mean TC 1-3 and 1-4 are for respective capabilities?

Qualcomm: if the UE does not support it, the UE measures it and the delay is scaled by 2. Both capabilities are accommodated in each single test.

Huawei: TC 1-3 and 4 are not for UE with respective capabilities. Both test cases test both capabilities.

CATT: is it possible to configure different SMTC-s from different satellite to test different UE capabilities?

MediaTek: same view as Huawei. We can have different requirements for different UE capabilities.

Qualcomm: to CATT, is it about the SMTC numbering? 1-3 is about timer based cell reselection and it is GEO. It is possible to configure different satellite in the Test environment.

Nokia: in sib19 the satellite information is included. We do have different satellite configurations in the tests.

**Agreement:**

* + Use the following SMTC configurations for TC 1-1 – 1-4.
    - TC 1-1: serving cell in SMTC1, neighbor cell in SMTC2, SMTC1 and SMTC2 non-overlapping
    - TC 1-2: serving cell in SMTC1, neighbor cell in SMTC2, SMTC1 and SMTC2 overlapping
    - TC 1-3 and 1-4: serving cell in SMTC1, neighbor cell in SMTC1
    - Scaling factor “K\_multi” is taken into account in the testing requirement for TC 1-1 – 1-4.
  + Use the same SMTC configuration as in A.6.1.1.2 for TC 1-5- 1-8, and scaling factor “K\_multi” is not taken into account in the testing requirement.
  + The requirements in TC 1-3 and 1-4 should be based on UE capability: parallel measurements on more than one NGSO satellite within one SMTC; and different requirements are applied to different UE capabilities.

**Issue 3-3: Test setup for intra/inter-frequency cell reselection with timer trigger.**

* Proposals
* Option 1: (Huawei)
  + TC 1-3 and 1-7 consists two time periods T1 and T2:
    - Before test: UE camps in cell1, and t-Service is included in SIB19 of cell1
    - T1: cell2 is powered off, T1 is long enough to make UE have no information about cell2
    - T2: cell2 is powered on, T2 is 40s, t-Service is pointed to the time point (start of T2 + 36s)
    - UE should reselect to cell2 before t-Service

**Discussion:**

Qualcomm: we agree with the margin and further agree to option1.

Nokia: we agree with option 1 in general. But for 36s, we need to allow time for the UE to acquire sib19. We need to double check the exact value.

Huawei: we can put 40 and 36 in the brackets.

**Agreement:**

* TC 1-3 and 1-7 consist of two time periods T1 and T2:
  + Before test: UE camps in cell1, and t-Service is included in SIB19 of cell1
  + T1: cell2 is powered off, T1 is long enough to make UE have no information about cell2
  + T2: cell2 is powered on, T2 is [40]s, t-Service is pointed to the time point (start of T2 + [36s])
  + UE should reselect to cell2 before t-Service

**Issue 4-2: Test case for CHO with time/location-based condition.**

* Proposals
* Option 1: (CATT)
  + It is not necessity of adding test cases in which settings don’t fulfill power based events and time/location based events simultaneously, to examine UE’s behavior in this type of scenario.
* Option 2: (CMCC)
  + Add a test case in which test setting don’t fulfill power based events and time/location based events simultaneously.
    - Set the time instant fulfilling t1-Threshold-r17 at (T2+2\*Tmeasure), and set the time instant fulfilling duration-r17 at (T2+ 3\*Tmeasure ).
    - Test requirement should be 2\*Tmeasure + Tinterrupt + TCHO\_execution from the start of T2, others shall follow A.6.3.1.2

**Discussion:**

CMCC: we support option 2 since in the field power based events happen often. The UE needs to be verified.

Huawei: we support option 1. The functional features are not in the scope of RRM test cases. We do not have power based events test cases for TN CHO.

Xiaomi: we agree with Huawei. We prefer to follow the legacy way as in the TN test cases.

**Issue 5-1: UE timing TC for 30 kHz SCS scenario.**

* Proposals
* Option 1: (Xiaomi, OPPO, Huawei)
  + RAN4 to define one test case including both 15 kHz and 30 kHz test configuration.
* Option 2: (CMCC, QC)
  + No need to define UE timing test configuration for FDD 30kHz SCS scenario

**Discussion:**

CMCC: we prefer option 2 since we don’t see deployment demand for FDD 30kHz. But we are ok to compromise to option 1 to have test coverage.

Qualcomm: even in TN, we don’t have FDD 30kHz requirements.

Apple: we share the same view with CMCC and Qualcomm. We could consider adding test cases in the future.

THALES: maybe we need to check again with the operators. Let’s consider 15kHz as first priority and later consider 30.

Huawei: we can compromise to option 2. Let’s add a note that 30 can be added in the future if there is demand from the operators.

CMCC: we agree with this note.

**Agreement:**

* No need to define UE timing test configuration for FDD 30kHz SCS scenario for UE timing test cases.
  + 30kHz test cases can be added when there is operator demand in the future

**Issue 5-3: Reference timing for uplink transmission in test cases.**

* Proposals
* Option 1: (CMCC)
  + For the test requirement, the reference time should be (NTA + NTA\_offset + NTA,common + NTA,UE-specific) ×Tc ±T\_e\_NTN
    - For the NTA,common and NTA,UE-specific in the test requirement, the description should at least contain the clarification that UE GNSS estimation error and satellite positioning error from UE calculation are not involved.
* Option 2: (Huawei)
  + For NTN UE timing testing, it is suggested to define a reference orbit for the serving satellite, and the DL timing shall be adjusted according to the distance change between serving satellite and UE.
  + For NTN UE timing test cases, the propagator model to be used for serving satellite position estimation is up to UE implementation, and there is no need to define a reference propagator model.
* Option 3: (Qualcomm)
  + In RRM test cases, when a test equipment adjusts downlink transmission frame boundary/Doppler shift and UL reception timing, asymmetric propagation delays on DL and UL for the same slot index shall be taken into account. To model the round trip delay over service link (N\_{TA,UE-specific}), the following definitions of reference slot for S3 and S4 (based in Fig. 3) are adopted.
    - for S3, the slot when the UL transmission is supposed to arrive at the target satellite based on provided valid ephemeris information (no error in the provided ephemeris information will account for UE error) and a reference propagator model
    - for S4, the slot when the DL transmission corresponding to the reference timing of downlink is supposed to arrive at the target satellite based on actual received time of the slot and provided valid ephemeris information (no error in the provided ephemeris information will account for UE error) and a reference propagator model

Graphical user interface

Description automatically generated

* Option 4: (Nokia)
  + UE must update the values of using the ephemeris information and using the common delay formula at the beginning of every uplink slot.
  + Define the requirements for application of the UE autonomous components of the timing advance:
    - Option 1: UE considers the satellite movement. The timing advance components consider the common delay and UE-satellite distance at the moment the UL signal reaches the satellite
    - Option 2: UE does not consider the satellite movement. The timing advance components consider the common delay and UE-satellite distance at the moment the UE is updating their values.
    - Option 3: Asks RAN 1 to clarify the application of these components.

**Discussion:**

CMCC: to option 3, is propagator model used by TE or UE?

Qualcomm: if the model is needed it is used by TE side to calculate the UE information. We think the propagator model is needed in the spec as the reference. In the test there is broadcast in the SIB19, we don’t care about the error anyway we will start from ephemeris info. TE measures UE UL timing and compare it with the reference timing. TE needs satellite position for the reference timing and it should not be based on the ideal position since we don’t have the inaccuracy info to the broadcasted values.

Nokia: there are two things to be specified. What is the reference point to be checked at TE. And at what point in time does the UE is expected to transmit and the signal arrives at the TE side.

Huawei: it is related with issue 2-2. We need to set the ideal positions as a reference. Then the TE adjusts the DL timing according to the propagation delay between UE and satellite. Option 3 uses estimated positions based on fixed propagator model. But the model is up to UE implementation. It should not be considered as the ideal positions.

Xiaomi: regarding the propagator model, the UE is implemented with different models in the fields so there is no need to introduce the model in the spec. the inaccuracy mentioned by QC is already considered in Te requirements.

MediaTek: option 3 and 4 define time points for UE to update TA values. We need to allow different implementations to pass the tests.

Apple: from TE side, if we use trajectory model the positions is ideal. UE location is also ideal to the TE. From UE side, as long as it meets Te requirements, the propagator error is already included. It is enough for the UE verification.

Ericsson: To Qualcomm what is the not ideal position if you don’t use the ideal positions. S3 and S4 if we define them, how do we make them compatible with the RAN1 spec. in section 4.2 there is already timing spec.

Qualcomm: TE knows the ephemeris info all the time from the trajectory model. This ephemeris has error and UE does not depend on this info since there is error. Any UE uses better model should be allowed. In our simulation, we use a simple model and the accuracy is good enough. The reason we introduce it in the spec is that it is totally aligned with RAN1. S3 and S4 are clearly defining T.

CMCC: TE needs a propagator model to translate the motion trajectory to ephermeris information whicha can be broadcasted in the SIB19. During this translation some error is involved, and this error is not from UE side. Option 3 needs further checking.

THALES: propagator model is important. The UE needs to predict, and this helps the accuracy. The reference is in paper R1-2106556. Section 4.5 is where the reference is at.

**Issue 6-1: SMTC configuration for measurement delay TCs.**

* Proposals
* Option 1: (Huawei)
  + For intra-frequency TCs (10-x),
    - Config.1: 2 SMTC per MO, each SMTC contains 1 SSB/Satellites
      * Config.1a: two SMTCs are overlapping
      * Config.1b: two SMTCs are non-overlapping
    - Config.2: 1 SMTC per MO, each SMTC contains 2 SSBs/Satellites
  + For inter-frequency TCs (11-x):
    - Config.0: 1 SMTC per MO, each SMTC contains 1 SSB/Satellites
      * Config.0a: two SMTCs are overlapping
      * Config.0b: two SMTCs are non-overlapping
* Option 2: (Xiaomi)
  + RAN4 not to define the SMTC/satellite configuration with 2 SMTC per MO and each SMTC contains 2 SSB/Satellites.
* Option 3: (OPPO)
  + If the case of multiple satellites in one SMTC is necessary, support 2-SMTC with 2 satellites in one SMTC and 1 satellite in another SMTC.

**Discussion:**

4.3 Extending current NR operation to 71GHz

4.3.5 RRM core requirement maintenance

**R4-2215416 Discussion of remaining issues on RRM core requirements for extension to 71GHz**

*Type: discussion For: Discussion  
 Source: CATT*

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

4.3.5.1 General

**R4-2215617 Remaining general aspects for NR operation in 52.6GHz - 71GHz**

*Type: discussion For: Approval  
 Source: Apple*

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

**R4-2215799 Discussion on TCI assumption for RSSI measurement for FR2-2**

*Type: discussion For: Discussion  
 Source: LG Electronics Inc.*

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

**R4-2215800 CR on QCL-ed assumption for inter-frequency RSSI measurement in FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2605 rev Cat: F (Rel-17)  
  
 Source: LG Electronics Inc.*

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

**R4-2216256 CR on applicability of RRM requirements with CCA in FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2611 rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216261 Discussion on general requirements on FR2-2**

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

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

**R4-2216262 CR on RLM requirements for FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2612 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216263 CR on SCell activation requirements of FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2613 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216882 Draft CR on Measurement Procedures**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

4.3.5.2 Timing requirements

4.3.5.3 LBT impacts on RRM requirements

**R4-2215618 LBT impacts on RRM requirements for NR operation in 52.6GHz - 71GHz**

*Type: discussion For: Approval  
 Source: Apple*

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

**R4-2216257 Discussion on RRM requirements with CCA in FR2-2**

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

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

**R4-2216264 Discussion on LBT impact on requirements for FR2-2**

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

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

**R4-2216265 CR on LBT assumption for FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2614 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216266 CR on RSSI measurement for FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2615 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216606 Reply LS on signalling of CCA configurations of neighbour cells in FR2-2**

*Type: LS out For: Approval  
 to RAN2, cc RAN1  
 Source: Nokia, Nokia Shanghai Bell*

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

4.3.6 RRM performance requirements

**R4-2215417 Further discussion on general RRM performance requirements for NR extension to 71 GHz**

*Type: discussion For: Discussion  
 Source: CATT*

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

4.3.6.1 General (Test configurations, side conditions and spec structure)

**R4-2216259 Discussion on RRM performance timing requirements in FR2-2**

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

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

**R4-2216267 Discussion on performance requirements for FR2-2**

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

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

4.3.6.2 Test cases with and without CCA

4.3.6.2.1 Test cases for RRC\_IDLE/RRC\_INACTIVE mode

4.3.6.2.2 Test cases for RRC\_CONNECTED mobility

**R4-2215418 Draft CR on test cases for SA RRC Re-establishment for extending NR operation to 71GHz**

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

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

**R4-2216258 Draft CR random access test cases in FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216268 CR on test cases for HO for FR2-2**

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

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

4.3.6.2.3 Test cases for timing

4.3.6.2.4 Test cases for signaling characteristics

**R4-2215419 Draft CR on test cases for Beam failure detection and link recovery for extending NR operation to 71GHz**

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

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

**R4-2216260 Draft CR introducing BFD and TCI state switch test cases in FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216501 draft CR on Test Cases on RLM for SCell activation to 71GHz**

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

**Abstract:**

draft CR on Test Cases on RLM for SCell activation to 71GHz

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

4.3.6.2.5 Test cases for measurement

**R4-2215863 Draft CR on introduction of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: vivo*

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

4.3.8 Moderator summary and conclusions

**[104-bis-e][203] NR\_ext\_to\_71GHz\_RRM\_1, AI 4.3.5 – Zhongyi Shen**

**R4-2216914 Email discussion summary for [104-bis-e][203] NR\_ext\_to\_71GHz\_RRM\_1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-12**

***Core maintenance: LBT impact on RRM requirements***

**Issue 2-1-1: maximum separation between two consecutive measurements**

* Proposals
  + Option 1: The requirement apply provided any two measurement shall not be separated in time by more than the maximum time requirement for the cell to remain known. (Nokia)
  + Option 2: (Apple, CATT)

The requirement only applies when

* Within the set of measurements any two measurements shall not be separated in time by more than 2 seconds when no DRX is configured, and
* Within the set of measurements any two measurements shall not be separated in time by more than max(1 DRX occasion group duration, 2 seconds) when DRX is configured.

**Discussion:**

**Agreement:**

**[104-bis-e][204] NR\_ext\_to\_71GHz\_RRM\_2, AI 4.3.6 – Prashant Sharma**

**R4-2216915 Email discussion summary for [104-bis-e][204] NR\_ext\_to\_71GHz\_RRM\_2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-12**

***Performance: CCA aspects in test cases***

*Agreement: For CCA model in test cases, an unavailable SSB/SMTC group can be modelled as that there is exactly one SSB not transmitted by TE in N consecutive SSB/SMTC occasions*

*• Shift SSB index in each N consecutive SSB/SMTC occasions rather than keeping one fixed SSB index*

*• FFS: Exact shifting pattern*

**Issue 1-5-1: CCA modelling in test cases**

* Proposals
* Proposal 1 (Huawei): Define CCA model as follows:
  + Prior to each SSB/SMTC group which is consist of 12 SSB/SMTC, the test equipment shall determine whether the CCA attempt is successful based on probability PCCA\_DL.
  + If the CCA attempt is determined to be successful, then the test equipment shall transmit remaining transmissions for the SSB/SMTC group.
  + If the CCA attempt is determined to be unsuccessful, one of the SSB shall not be transmitted by the test equipment. The SSB within the SSB/SMTC group shall be randomly chosen from all SSBs within the group. The test equipment shall transmit rest transmissions for the SSB/SMTC group
* Proposal 1b (new): Define CCA model as follows:
  + Prior to each SSB/SMTC group which is consist of 12 SSB/SMTC, the test equipment shall determine whether the CCA attempt is successful based on probabilities PCCA\_DL1 and PCCA\_DL2.
  + If the CCA attempt is determined to be successful, then the test equipment shall transmit remaining transmissions for the SSB/SMTC group.
  + If the CCA attempt is determined to be unsuccessful, **none** of the SSB/SMTC **occasions** shall be transmitted by the test equipment during the SSB/SMTC group **for that SSB index**.
* Proposal 2 (Huawei): Define PCCA\_DL = 0.9 in each test case, which is the probability that all SSBs are available within one SSB/SMTC group
* Proposal 2b (new): Define PCCA\_DL1 = PCCA\_DL2 = 0.75 in each test case, which is the probability that all SSBs are available within one SSB/SMTC group

**Discussion:**

Huawei: what are PCCA\_DL1 and 2? Is it that different probabilities for different SSB indexes?

Nokia: P1 and 2 are for different SSB candidates. For each index there might be two candidates and only both candidates are missed do you have LBT failure. 1 and 2 are to represent the two candidate positions in each block.

Apple: when we define SMTC occation group, in one of the SSB occasions the BS cannot transmit the entire burst if there is CCA failure. It is not aligned with the core requirements at least.

Huawei: we agree with Apple. If the group is considered not available two indexes are both not available.

Vivo: we share same view with Apple and Huawei. We need to further discuss on the two probabilities.

Qualcomm: the comments from companies make sense. We also prefer a single probability.

Nokia: candidates positions and indexes are different. We could clarify that PCCA\_DL1 or 2 depending on positions.

**Issue 1-5-2: SSB index shift**

* Proposals
  + Proposal 1 (CATT): In order to test the behaviour of UE more thoroughly, it is suggested to use a fixed sequential mode to shift the SSB index.
    - For example, the unavailable SSB in the first 12 SSBs could be the first SSB, the unavailable SSB in the second 12 SSBs could be the second SSB, and so on.

**Discussion:**

Apple: here we need to remove ‘index’.

Qualcomm: we don’t understand unavailable SSB occasion.

Nokia: the agreement was shift SSB index in each inconsecutive occasions.

Vivo: we have different understanding on the issue itself. SSB burst set/occasion is shifted including multiple indexes.

CATT: we prefer to use index. We should follow the agreements we had.

Huawei: the intention is to introduce randomness in the test. In the tests we have 1 index configured.

Session chair: check on the wording of SSB index. The proposal 1 is in principle consensus to the group.

**Issue 1-1-1: Test configurations - General**

* Proposals
  + Proposal 1 (Nokia): The test configurations in which the UE is required to be tested must be discussed for each test case

**Discussion:**

**Issue 1-1-2: Test configurations - Timing**

* Proposals
  + Proposal 1 (Nokia): UE is required to be tested with the largest supported SCS for UL transmit timing test cases
  + Proposal 2 (Nokia): UE is required to be tested with the largest supported SCS for timing advance accuracy test cases

**Discussion:**

Apple: we make sure we have good coverage and we minimize the test burden from UE. Only the largest is tested?

Nokia: in most of the test cases, we have different SCS configurations. The UE chooses the configuration it is tested. We want to test the UE with the most meaningful configuration.

Huawei: regarding the applicability, UE can pass certain tests and skip some others. Only when we are confident that testing under one configuration guarantees the performance in others. Here it is not. We support proposal 1 and 2.

Apple: we agree with this approach with minimum burden.

Qualcomm: we need to differentiate 120kHz tests and 480/960kHz tests.

4.5 Further enhancements on MIMO for NR

4.5.1 RRM core requirement maintenance

4.5.1.1 Unified TCI for DL and UL

**R4-2215353 Discussion on remaining issue about Unified TCI state in FeMIMO**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215591 On remaining issues for unified TCI requirements**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215592 CR for unified TCI**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2595 rev Cat: F (Rel-17)  
  
 Source: Apple*

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

**R4-2215743 Discussion on remaining issues of FeMIMO RRM core requirements for unified TCI state**

*Type: discussion For: Discussion  
 Source: Samsung*

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

**R4-2215764 Discussion on unified TCI for DL and UL**

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

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

**R4-2216280 Discussion on RRM remaining issues for R17 unified TCI framework**

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

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

**R4-2216281 CR on maintaining TCI state switching requirements for R17 unified TCI**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2616 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216360 Discussion on remaining issues in unified TCI in R17 feMIMO**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216361 CR on unified TCI in R17 feMIMO**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2628 rev Cat: F (Rel-17)  
  
 Source: vivo*

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

**R4-2216486 Discussion on Unified TCI for DL and UL**

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

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

**R4-2216596 Remaining issues for UL TCI state switch delay**

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

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

**R4-2216817 Discussion on remaining issues on Unified TCI for DL and UL**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses about remaining open issue of unified TCI state switching

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

**R4-2216818 CR on maintenance of unified TCI state switching requirements**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2646 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This contribution proposes maintnece of unified TCI state switching

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

4.5.1.2 Inter-cell beam management

**R4-2215354 Discussion on remaining issue about inter-cell beam management in FeMIMO**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215593 On remaining issues for inter-cell beam management**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215594 CR for inter-cell beam management**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2596 rev Cat: F (Rel-17)  
  
 Source: Apple*

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

**R4-2215744 Discussion on remaining issues of FeMIMO RRM core requirements for inter-cell beam management**

*Type: discussion For: Discussion  
 Source: Samsung*

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

**R4-2215765 Discussion on inter cell beam management**

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

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

**R4-2215767 CR on applicability of R17 inter cell beam management for FR2-2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2603 rev Cat: F (Rel-17)  
  
 Source: MediaTek Inc.*

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

**R4-2216282 Discussion on RRM remaining issues for R17 inter-cell beam managements**

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

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

**R4-2216283 CR on maintaining L1-RSRP measurement requirements for R17 inter-cell BM**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2617 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216362 Discussion on remaining issues in inter-cell beam managements in R17 feMIMO**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216363 CR on inter-cell beam managements in R17 feMIMO**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2629 rev Cat: F (Rel-17)  
  
 Source: vivo*

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

**R4-2216485 Discussion on remaining RRM requirements for inter-cell beam management**

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

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

**R4-2216819 Discussion on remaining issues of Inter-cell beam management**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses about remaining open issue of sharing factor design

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

**R4-2216820 Maintenance CR on inter-cell BM**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2647 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

CR to capture the sharing factor for SC and CDP L1-RSRP

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

4.5.1.3 Others

**R4-2215747 Correction on requirements for TRP specific link recovery procedures**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2600 rev Cat: F (Rel-17)  
  
 Source: Samsung*

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

**R4-2216487 CR on SFN based RLM and LRP**

*Type: CR For: Endorsement  
 38.133 v17.7.0 CR-2636 rev Cat: F (Rel-17)  
  
 Source: ZTE Corporation*

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

4.5.2 RRM performance requirements

4.5.2.1 General (test configurations, side condition and etc)

**R4-2216364 Discussion on R17 feMIMO test case configurations**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216821 Discussion on test cases for TRP specific BFD and LR**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Test configuration for TRP specific BFD and LR

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

4.5.2.2 Test cases for unified TCI state switching

**R4-2215745 Discussion on remaining issues of test cases for unified TCI state**

*Type: discussion For: Discussion  
 Source: Samsung*

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

**R4-2215766 Draft CR on TC for joint unified TCI state switching in FR2 NR SA**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: MediaTek Inc.*

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

**R4-2216365 Draft CR on test case for DL TCI state switching for Cell with different PCI in FR2 NR-SA**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: vivo*

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

**R4-2216822 CR on maintenance of UL TCI state switching of FR2 PCell**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2648 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Test configuration for TRP specific BFD and LR

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

4.5.2.3 Test cases for L1-RSRP measurement on cells with different PCI

**R4-2215974 Draft CR on TC of L1-RSRP measurement on cells with different PCI**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Samsung*

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

**R4-2216366 Draft CR on test case for L1-RSRP measurement procedure in FR1 NR-SA**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: vivo*

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

4.5.2.4 Test cases for TRP specific BFD and LR

**R4-2215358 Discussion on TRP specific Beam Failure Detection and Link Recovery Test case**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215746 Discussion on remaining issues of test cases for TRP specific BFD and LR**

*Type: discussion For: Discussion  
 Source: Samsung*

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

**R4-2216284 DraftCR on maintaining TRP specific BFR test cases**

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

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

**R4-2216823 maintenance CR on test cases for TRP specific BFD and LR**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2649 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Test configuration correction for TRP specific BFD and LR

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

4.5.4 Moderator summary and conclusions

**[104-bis-e][205] NR\_feMIMO\_RRM\_1, AI 4.5.1 – Hua Li**

**R4-2216916 Email discussion summary for [104-bis-e][205] NR\_feMIMO\_RRM\_1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-11**

***Core maintenance: Issues related to Enhanced TCI state switch requirements***

**Issue 1-1-1 Whether UE need to track UL time/frequency for UL TCI state activation**

* Background
  + In spec, the issue is written in brackets:
  + [For active UL or joint TCI state, a UE is expected to track timing or frequency derived from DL-RS associated with a source RS in UL TCI state or joint TCI.]
* Proposals:
  + Proposal 1(Intel, Apple, Samsung, Huawei):
    - No
  + Proposal 2(vivo, ZTE):
    - Adding some applicability rules on current RRM requirements for UL TCI switching, i.e. RRM requirements for R17 UL TCI switching are only applicable when source RS in active UL TCI state is a subset of source RS in DL active TCI list.
  + Proposal 3(Ericsson):
    - UL TCI state needs to follow the time and frequency tracking of the DL-RS configured in the UL TCI state.
  + Proposal 3a(Nokia):
    - Rel-17 active UL TCI state should be under time and frequency tracking. This means that active UL TCI list belongs to active DL TCI state list. Add the time and frequency tracking condition to the active TCI state for UL.

***Moderator note: the controversial part is revised to issue 1-1-1b.***

**Issue 1-1-1a If source RS in UL TCI state is in the DL active TCI list:**

Tentative agreement:

No time/frequency tracking is needed.

**Issue 1-1-1b If source RS in UL TCI state is not in the DL active TCI list:**

Proposals:

Option 1: No time/frequency tracking is needed.

Option 2: Time/frequency tracking is needed.

Option 3: No requirement for the case.

**Discussion:**

**Agreement:**

**Issue 1-2-1 Joint TCI switching delay requirement for DL TCI state switch**

* Proposals
  + Option 1 – Remove the square bracket:
    - [In case of joint TCI state switch, UE is not expected to receive on DL before UE completes the DL and UL TCI state switch]
  + Option 2:
    - For joint TCI state switch, if the UL TCI state switch delay exceeds the DL TCI state switch delay, the UE is required to receive in DL up to THARQ before it completes UL TCI state switch.
  + Option 3:
    - No matter whether UL TCI state switching completed or not, UE can receive DL by the target DL TCI state given that DL TCI state switching has been finished. So we suggest the bullet in square brackets can be ignored.

**Discussion:**

Nokia: for 15khz the Tharq is 3ms?

Qualcomm: I don’t see the benefit in option 2 or option 3. The UE cannot send UL then there is no ponint in scheduling in the DL.

Vivo: Tharq is the feedback and scheduling and it is depending on scheduling so it is not determined to UE.

MediaTek: we agree with Qualcomm.

ZTE: we think in the last meeting, companies proposed that the UE can transmit HARQ ACK through old UL TCI state.

Apple: we had the agreement to remove the brackets but only not implemented in the spec.

Nokia: we do not reach the agreement.

Ericsson: if we could agree on a shorter UL state swich delay maybe we don’t need to discuss this.

Session chair: let’s check whether there is already agreement on this matter.

**Issue 1-2-2 MAC-CE based UL TCI state switching delay when SSB is indicated as PL-RS in UL TCI state for FR2**

* Proposals
  + Proposal 1(Apple, Samsung, Huawei):
    - longer delay is expected.
  + Proposal 2(Huawei):
    - No requirements when SSB is indicated as PL-RS in UL TCI state in FR2.
  + Proposal 3(Intel):
    - the total delay is:

- n+THARQ + 3ms + NM*\** (Tfirst\_target-PL-RS + Q\*Ttarget\_PL-RS + 2ms)

- Where Q is the extended number of SSB resource number, Q is FFS.

* + Proposal 4(MTK, vivo, Ericsson, ZTE):
    - Reuse the existing delay requirement of MAC CE based UL TCI state switch.
  + Proposal 5(Nokia):
    - The number of sample M will not always be fixed as 5 samples.
    - If a UE performs both L1-RSRP measurements and PL-RS measurements on the same SSB, the number of samples used for L1-RSRP is counted for pathloss measurement.

**Discussion:**

**Agreement:**

**Issue 1-4-1 MAC CE based TCI state list update delay for unknown TCI state**

* Background
  + In current spec:
  + If one or more TCI states in the active TCI state list is unknown, active DL TCI state list update delay is FFS.
* Proposals
  + Proposal 1:
    - longer delay applies for active DL TCI state list update
  + Proposal 2:
    - Detailed delay requirement:

e.g. n + + (THARQ + TL1-RSRP + Tfirst-SSB\_List + TSSB-proc) / *NR slot length.*

**Discussion:**

**Agreement:**

***Core maintenance: Issues related to Applicability of ICBM feature***

**Issue 2-3-1: Applicability of ICBM feature**

* Background
  + In spec, there is editor note:
  + *[Editor’s Note: Whether inter-cell L1-RSRP measurement requirements are applicable in HST scenario]*
* Proposals
  + Proposal 1:
    - Do not extend the ICBM feature and/or requirements to other concurrent Rel-17 WIs
  + Proposal 2:
    - R17 ICBM feature is applicable to FR1 HST and FR2 HST.

**Discussion:**

**Agreement:**

**[104-bis-e][206] NR\_feMIMO\_RRM\_2, AI 4.5.2 – Yanze Fu**

**R4-2216917 Email discussion summary for [104-bis-e][206] NR\_feMIMO\_RRM\_2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-11**

***Performance: Test cases for TRP specific BFD and LR***

**Issue 3-1-1: Whether intra-cell TRP or inter-cell TRP specific BFR test cases are designed?**

* Proposals
  + Option 1 (Intel)
    - Design intra-cell TRP specific BFR test case.

**Discussion:**

Intel: all the TC are designed for intra-cell currently. We need to make sure SSB index are different in the test cases. So the measurement times are not scaled due to overlap. But for the CSI-RS based tests, overlap is observed and measurement time is scaled.

Huawei: we are ok to option 1.

Samsung: we have 6 test cases for BFR among which 4 are CSI-RS and 2 are SSB based ones. We prefer to use SSB from different PCI for SSB based test cases. For CSI-RS BFR we agree with using intra-cell as the assumption.

Apple: we support option 1. It is efficient to define intra-cell cases. There is no necessary to define test cases under SSB from different PCI.

MediaTek: we also support option 1. We share the same view with Apple.

Samsung: from RAN1 spec 38213, the UE can be provided with two sets of RS-s with different PCI. There is no clear definition for SSB from the same cell. Is it the case?

Apple: our understanding on the RAN1 spec SSB based BFD RS for Q00 and Q01 is not configurable but RAN2 spec they have the signalling ready. The BFD RS can be signalled as either CSI-RS or SSB.

Samsung: for safety we can define inter-cell SSB based test cases.

Nokia: for SSB based TC we go with intra-cell but for CSI-RS TC we could go with inter-cell assumption.

Ericsson: we support Nokia opinion. The only issue here is whether the SSB is overlapped from the two TRP. So the configuration is clear for SSB-based test cases.

**Issue 3-1-2: Beam recovery method configured in the test case**

* Proposals
  + Option 1 (Ericsson)
    - RAN4 to agree to test following
      * For BFR on SpCells, CFRA and CBRA based BFR is configured for different test cases
      * For BFR on SCells, dedicated BFR resource is configured and not configured for different test cases

**Discussion:**

Ericsson: here whether RA or dedicated BFR resource is configured for the test cases. We propose to have some TC to use RA and some to use dedicated BFR.

Apple: we are wondering if we need to test all combinations. We have full test list for RA test cases. We need to further check on the configuration of CFRA and CBRA for SpCells. We are fine for the SCells using dedicated BFR.

Vivo: CBRA based BFR is optional UE feature.

**Agreement:**

* For BFR on SCells, dedicated BFR resource is configured and not configured for different test cases
* For BFR on SpCells, FFS in the 1st round in this meeting whether CFRA based BFR is configured

**Issue 3-1-3: If SSB is configurated as BFD-RS for TRP specific BFR test case, whether SSBs are overlapped or not?**

* Proposals
  + Option 1 (Ericsson, Intel)
    - If SSBs is configured as BFD-RS, they are not overlapped and the duration time will not be extended.
  + Option 2 (Samsung)
    - In FR2 TRP specific BFR test case, SSB/CSI-RS should be overlapped for TRP1 and TRP 2 to test PTRP = 2.

**Discussion:**

Session chair: let’s further check this together with 3-1-1 and comeback in the 2nd round.

**Issue 3-1-5: If CSI-RS is configurated as BFD-RS for TRP specific BFR test case, whether CSI-RSs are overlapped or not?**

* Proposals
  + Option 1 (Ericsson, Intel, Samsung)
    - Yes

**Discussion:**

**Agreement:**

* If CSI-RS is configured as BFD-RS for TRP specific BFR test cases, CSI-RSs are considered as overlapped.

***Performance: TC for unified TCI state switching***

**Issue 1-1-1: Pathloss RS configuration in joint TCI test case**

* Proposals
  + Option 1 (vivo)
    - RAN4 assumes that source RS of UL TCI can be used as pathloss RS if *pathlossReferenceRS-Id-r17* is not configured. Therefore, do not explicitly configure pathloss RS in joint TCI case and UL TCI test case.
  + Option 1a (Samsung)
    - For PL-RS configuration in joint TCI test case, prefer not to configure pathloss RS.
  + Option 2 (MTK (CR-2215766))
    - PL-RS is configured. UE should maintain PL-RS before and after TCI state switch in the test.

**Discussion:**

Huawei: we support to configure the PLRS explicitly for joint TCI state swiching and UL TCI state test cases.

Apple: we also prefer to configure explicitly. PLRS is configured but whether it is maintained or not defpends on the test cases.

Samsung: in joint TCI test cases since the PLRS can be option al field we prefer not to configure it. Use the same principle in the UL test cases where the PLRS is not maintained.

Vivo: in the last meeting there was one LS sent to RAN1 about what the cases are if the PLRS is not configured. We should revisit this one after RAN1 feedback.

Nokia: we have similar view as vivo.

Ericsson: when the PLRS is not configured explicitly the source could be the PLRS. It is typical case and we should test it. We could wait for RAN1 feedback and come back to it.

Apple: in our understanding the LS was about clarifying the active UL TCI state list and the relation of maintaining PLRS. It is a different issue. We need to check further on the RAN1 spec about default behaviour when PLRS is not configured. We should focus on the switching itself in the test cases in stead of testing the fall back behaviours.

Ericsson: in other WI, RAN1 spec mentions that the default behaviour is to use the source RS as the PLRS. We could reuse.

Huawei: we agree with Apple that the tests are for TCI state switching but not to verify the default behaviour.

**Issue 1-1-2: How to define PL-RS of target TCI?**

* Proposals
  + Option 1 (vivo)
    - RAN4 design test cases for unified TCI by configuring that PL RS of target TCI is not QCL-D with the any PL RS of the TCI in the currently activated TCI list.

**Discussion:**

Vivo: we should specify the TC when the PLRS is not maintained. Which means that the PLRS is not QCL-ed type D with any RS that is within the active TCI state list.

Nokia: this also the discussion point in core discussion. How to specify the definition of maintained PLRS has impact on the delay requirements. We need to go to core discussion first.

Huawei: whether it is maintained or not has nothing to do with the delay. When there are over 4 RS configured the UE could not maintain all of them.

Apple: we agree with Huawei. If the PLRS is in the active TCI state list, the UE is expected to maintain the PLRS. We sent an LS to RAN1 to ask about the correct behaviour if the number is over 4.

Vivo: to clarify, why do we need to configure more than 4 RS in the test cases.

Nokia: we do not have TCI state list for UL. We can have up to 4 tracked by the UE according to RAN1 agreement. It is ok to wait for the reply.

Apple: in the unified TCI state framework in R17, we have UL TCI state/joint TCI state list. We don’t need to configure more than 2 RS in the list if we assume the PLRS is maintained.

Nokia: we don’t have a clear agreement if the UE tracks the timing on the RS in the list.

**Issue 1-1-3: How to configure maintained PL-RS / NOT maintained PL-RS in the test case**

* Proposals
  + Option 1 (Samsung)
    - In the test cases, only define the test cases for PL-RS is not maintained. For the test setup, configure a new RS as PL-RS, it is a “not maintained PL-RS”.

**Discussion:**

**Issue 1-2-1: TRS configuration for cell with different PCI in the test case**

* Proposals
  + Option 1 (vivo)
    - RAN4 may clarify in Note 4 of A.3.16.A.2-1 by adding the following sentence. ‘The TCI state of the TRS is the same as TCI.state.1 except that the additionalPCI field is also configured with PCI 0.’ In this case, no need to introduce a new TRS configuration or new TCI configuration.

**Discussion:**

4.6 Support of reduced capability NR devices

4.6.3 RRM core requirement maintenance

4.6.3.1 Impacts from UE complexity reduction

**R4-2215962 Discussion on LS on configuring margin for 1 Rx RedCap UEs**

*Type: discussion For: Discussion  
 Source: vivo*

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

4.6.3.1.1 General

**R4-2215364 Discussion on the negative configuring margin for RSRP change threshold of 1 Rx RedCap UEs**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215365 CR on 1Rx. margin for RedCap UEs configured with relaxed measurement criterion**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2587 rev Cat: F (Rel-17)  
  
 Source: Intel Corporation*

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

**R4-2216215 Discussion on remaining RRM issues for RedCap UEs**

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

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

**R4-2216216 CR 38.133: Corrections to SDT requirements for RedCap**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2609 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216291 Correction to idle measurement requirements for RedCap Ues**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2618 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216855 On offset for cell specific RSRP thresholds for 1Rx Redcap UE**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper analyze the specification of the offset for cell specific RSRP thresholds included in LS to RAN2 in R4-2214484.

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

**R4-2216856 Draft CR on offset for cell specific RSRP thresholds for 1Rx Redcap UE in 38.133**

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

**Abstract:**

The draft CR defines offset for cell specific RSRP thresholds in 38.133 included in LS to RAN2 in R4-2214484.

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

4.6.3.1.2 Mobility requirements

**R4-2215471 Discussion on remaining issues for mobility requirements for Redcap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2216455 Discussions on RedCap HO**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the HO requirements for RedCap

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

**R4-2216456 CR on RedCap HO**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2632 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To update the HO for RedCap

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

**R4-2216597 Discussion on offsets to cell-specific thresholds for 1 Rx RedCap UEs**

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

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

**R4-2216764 Changes to RRC\_IDLE mode requirements for RedCap for TS 38.133**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2644 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This CR contains additional changes to IDLE mode section based on the endorsed big CR from last meeting.

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

**R4-2216877 Mobility requirements for RedCap UEs**

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

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

4.6.3.1.3 Timing requirements

**R4-2216217 Discussion on timing requirements for RedCap UEs**

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

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

**R4-2216218 CR 38.133 Correction to Tx timing requirements for active BWP without SSB for RedCap**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2610 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216878 Timing requirements for RedCap UEs**

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

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

**R4-2216880 Draft CR on timing requirements with measurement gaps for RedCap UEs**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

4.6.3.1.4 Signalling characteristics

**R4-2215472 Discussion on remaining issues for signalling characteristics for Redcap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2216292 Discussion on signaling characteristics for RedCap**

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

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

**R4-2216598 Discussion on UE power saving for RedCap**

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

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

4.6.3.1.5 Measurement procedure

**R4-2215491 On RedCap measurement procedure**

*Type: discussion For: Decision  
 Source: CMCC*

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

**R4-2215606 On remaining issues of RRM requirement for RedCap UE**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Apple*

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

**R4-2215607 CR for serving cell thresholds of s-MeasureConfig for RedCap**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2599 rev Cat: F (Rel-17)  
  
 Source: Apple*

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

**R4-2216293 Discussion on measurement requirements due to UE complexity reduction**

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

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

**R4-2216294 CR on offset margin for 1Rx RedCap UE**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2619 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216457 Discussions on RedCap Measurement**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the measurement requirements for RedCap

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

**R4-2216458 CR on RedCap CGI**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2633 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To update the CGI reading for RedCap

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

**R4-2216599 Remaining issues on measurement procedures for RedCap**

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

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

**R4-2216771 Inter-RAT accuracy requirements for RedCap**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2645 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The current references are incorrect and need to be updated.

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

**R4-2216881 Draft CR on measurement procedures for RedCap UEs**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

4.6.3.2 Extended DRX enhancements

**R4-2216295 Discussion on Extended DRX enhancements for inactive RedCap UE**

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

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

**R4-2216296 Clarification on measurement for inactive mode RedCap UE**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2620 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216454 CR on RedCap eDRX**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2631 rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To update the eDRX for RedCap

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

4.6.3.3 RRM measurement relaxations

**R4-2215963 on remaining issues on RRM relaxation for Redcap**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216219 Discussion on RRM relaxations**

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

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

**R4-2216297 Correction on relaxed measurement for RedCap**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2621 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216763 Discussions on RRM measurement relaxations**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss RRM measurement relaxation for RedCap.

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

**R4-2216883 CR 38.133: RRM relaxations in case of failed S-criterion and SDT for RedCap**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2650 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

4.6.3.4 Others

**R4-2215470 Discussion on NCD-SSB time offset impact for RedCap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215598 CR on scheduling restrictions for L3 measurements in FR1 for RedCap**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2597 rev Cat: F (Rel-17)  
  
 Source: Apple*

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

**R4-2216220 Discussion on impact from NCD-SSB time offset**

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

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

4.6.4 RRM performance requirements

4.6.4.1 General (test configurations, side condition and etc)

**R4-2215492 NCD-SSB configurations and test cases**

*Type: discussion For: Decision  
 Source: CMCC*

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

**R4-2216307 Test case on E-UTRA – NR inter-RAT measurement performance for Redcap**

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

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

**R4-2216452 Discussions on RedCap NCD-SSB test design**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the NCD-SSB test case design for RedCap

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

**R4-2216453 draftCR on RedCap NCD-SSB RMC**

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

**Abstract:**

To add the RedCap NCD-SSB RMC

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

**R4-2216600 Discussion on NCD-SSB test cases for RedCap**

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

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

**R4-2216765 Updated test case list for RedCap RRM performance part**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Updated test case list based on already agreement document at previous meeting.

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

4.6.4.2 RRM test cases for FR1

4.6.4.2.1 Applicability rule, configurations and side conditions

**R4-2216298 Discussion on handover test for RedCap UE**

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

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

4.6.4.2.2 Test cases for RRC\_IDLE and RRC\_INACTIVE state mobility

**R4-2216601 draft CR on correction to IDLE mode test cases for RedCap in FR1**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

4.6.4.2.3 Test cases for RRC\_CONNECTED state mobility

**R4-2215473 CR on 4-step random access test in FR1 for RedCap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Xiaomi*

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

**R4-2216299 Test case for handover for FR1 RedCap UE**

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

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

**R4-2216602 draft CR on correction to CONNECTED mode test cases for RedCap in FR1**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216749 DraftCR on Intra-frequency handover from FR1 to FR1 unknown target cell for 2 and 1 Rx UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

4.6.4.2.4 Test cases for timing

**R4-2215420 CR on timing test for RedCap for FR1**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2591 rev Cat: F (Rel-17)  
  
 Source: CATT*

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

**R4-2216603 draft CR on corrections on timing test cases for RedCap**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216748 DraftCR on NR UE Transmit Timing Test for FR1 for 1 and 2 Rx UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

4.6.4.2.5 Test cases for signaling characteristics

**R4-2215474 CR on SSB-based RLM in-sync test in FR1 for RedCap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Xiaomi*

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

**R4-2215493 Draft CR on test case for FR1 active BWP swith and UE specific CBW change**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

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

**R4-2216301 RLM test cases for FR1 RedCap UE**

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

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

**R4-2216604 Draft CR introducing BFD and LR test cases for RedCap in FR1**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216750 DraftCR on Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode for 1 and 2 Rx UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

4.6.4.2.6 Test cases for measurement procedure

**R4-2215422 Draft CR for RedCap UEs for intra-frequency measurement in FR1**

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

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

**R4-2215808 CR on SA test with per-UE gaps under non-DRX with SSB index reading for intra-frequency measurement**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2606 rev Cat: B (Rel-17)  
  
 Source: OPPO*

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

**R4-2215964 draft CR for CSI-RS based L1-RSRP for Redcap**

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

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

**R4-2216305 Test case on SA inter-frequency measurement procedure in FR1 for Redcap**

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

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

**R4-2216751 DraftCR on SA event triggered reporting tests without gap under non-DRX for 1 Rx and 2 Rx UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

**R4-2216756 Draft CR on the test case for SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

**R4-2216772 RRM test cases for FR1: Measurement procedure**

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

**Abstract:**

This CR contains collection of test cases for RRM test cases for FR1: Measurement procedure.

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

4.6.4.2.7 Test cases for measurement accuracy

**R4-2216303 Test case for intra-frequency SS-RSRQ measurement accuracy for FR1 RedCap UE**

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

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

**R4-2216343 Draft CR for introduction of the test cases for FR1 measurement accuracy on Redcap**

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

**Abstract:**

This is a draft CR to TS 38.133 introducing Redcap FR1 measurement accuracy test cases

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

4.6.4.3 RRM test cases for FR2

4.6.4.3.1 Applicability rule, configurations and side conditions

4.6.4.3.2 Test cases for RRC\_IDLE and RRC\_INACTIVE state mobility

4.6.4.3.3 Test cases for RRC\_CONNECTED state mobility

**R4-2215475 CR on 4-step random access test in FR2 for RedCap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Xiaomi*

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

**R4-2216300 Test case for handover for FR2 RedCap UE**

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

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

4.6.4.3.4 Test cases for timing

**R4-2215421 CR on timing test for RedCap for FR2**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2592 rev Cat: F (Rel-17)  
  
 Source: CATT*

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

4.6.4.3.5 Test cases for signaling characteristics

**R4-2215476 CR on RLM in-sync and scheduling restriction in FR2 for RedCap UE**

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

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

**R4-2215494 Draft CR on test case for FR2 active BWP swith, UE specific CBW change, active TCI state switch and uplink spatial relation switch delay**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

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

**R4-2215965 draft CR for CSI-RS-based BFD and LR for FR2 PCell**

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

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

**R4-2216302 RLM test cases for FR2 RedCap UE**

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

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

4.6.4.3.6 Test cases for measurement procedure

**R4-2215423 Draft CR for RedCap UEs for intra-frequency measurement in FR2**

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

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

**R4-2215477 CR on SA event triggered reporting test with per-UE gaps under DRX for RedCap UE in FR2**

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

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

**R4-2215478 CR on SSB and CSI-RS based L1-RSRP measurement for RedCap UE in FR2**

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

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

**R4-2216306 Test case on SA inter-frequency measurement procedure in FR2 for Redcap**

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

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

**R4-2216752 DraftCR on SSB based L1-RSRP measurement when DRX is not used for FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

**R4-2216757 Draft CR on the test case for SA event triggered reporting test without gap under DRX**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

**R4-2216773 RRM test cases for FR2: Measurement procedure**

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

**Abstract:**

This CR contains collection of test cases for RRM test cases for FR2: Measurement procedure.

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

4.6.4.3.7 Test cases for measurement accuracy

**R4-2216304 Test case for intra-frequency SS-RSRQ measurement accuracy for FR2 RedCap UE**

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

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

**R4-2216344 Draft CR for introduction of the test cases for FR2 measurement accuracy on Redcap**

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

**Abstract:**

This is a draft CR to TS 38.133 introducing Redcap FR2 measurement accuracy test cases

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

**R4-2216753 DraftCR on SSB based L1-RSRP measurement for beam reporting for FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

**R4-2216754 DraftCR on CSI-RS based L1-RSRP measurement for beam reporting for FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.7.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

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

4.6.6 Moderator summary and conclusions

**[104-bis-e][207] NR\_redcap\_RRM\_1, AI 4.6.3 – Santhan Thangarasa**

**R4-2216918 Email discussion summary for [104-bis-e][207] NR\_redcap\_RRM\_1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-11**

***Performance: Issues related to NCD-SSB performance part***

**Issue 6-2-1: HO test cases in FR1**

* Types of test cases
  + Option 1 – differentiate CD-SSB and NCD-SSB with 1 Rx and 2 Rx:
    - 1 Rx tested with CD-SSB
    - 2 Rx tested with NCD-SSB
  + Option 2 – define 3 types of test cases
    - CD-SSB to CD-SSB
    - NCD-SSB to NCD-SSB
    - CD-SSB to NCD-SSB
  + Option 3: NCD-SSB for some selected test cases
    - Intra-frequency handover from FR1 to FR1; known target cell for 1 Rx UE
    - Intra-frequency handover from FR1 to FR1; unknown target cell for 2 Rx UE
    - Inter-frequency handover from FR1 to FR1; unknown target cell for 2 Rx UE
* Test cases list baseline (CMCC)

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | Intra-frequency handover from FR1 CD-SSB to FR1 CD-SSB; known target cell for UE (1Rx, 2Rx) |
| 2 | Intra-frequency handover from FR1 NCD-SSB to FR1 NCD-SSB; unknown target cell for UE (1Rx, 2Rx) |
| 3 | Inter-frequency handover from FR1 CD-SSB to FR1 NCD-SSB; unknown target cell for UE (1Rx, 2Rx) |

**Discussion:**

Intel: from the UE side, both 1Rx and 2Rx should be tested to guarantee the coverage. We understand CMCC proposal.

CMCC: we agree with Intel comments. Two different types of UE are considered definitely and there are only 3 cases for each of them here. We propose to consider both 1 and 2 Rx UE-s for all three cases.

Qualcomm: we also agree with CMCC. It is better to keep both types. For other things we are fine.

Huawei: in general we are fine with the principle. Maybe option 3 can be used as the starting point. We are fine with CMCC proposal.

Apple: we also share with comments from companies.

Nokia: we support option 3. And we support CMCC proposal.

Vivo: we are fine with the idea from Apple that for UE supporting both 1 and 2 Rx, only 2Rx is tested.

Apple: to clarify, we don’t have capability for 1 or 2Rx. If UE indicated 2 layer capability then it is tested under 2Rx.

Qualcomm: we support Apple clarification.

CMCC: we are fine with Apple clarification.

Nokia: we agree with this clarification.

**Agreement:**

* Test cases list for HO test cases in FR1

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | Intra-frequency handover from FR1 CD-SSB to FR1 CD-SSB; known target cell for UE (1Rx, 2Rx) |
| 2 | Intra-frequency handover from FR1 NCD-SSB to FR1 NCD-SSB; unknown target cell for UE (1Rx, 2Rx) |
| 3 | Inter-frequency handover from FR1 CD-SSB to FR1 NCD-SSB; unknown target cell for UE (1Rx, 2Rx) |

**Issue 6-2-2: HO test cases in FR2**

* Decide whether to define NCD-SSB test cases for FR2
  + Option 1: Define only for FR1
  + Option 2: Define same test cases for both FR1 and FR2
  + Option 3: Define subset of FR1 NCD-SSB test cases for FR2

**Discussion:**

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | Intra-frequency handover from FR2 CD-SSB to FR2 CD-SSB; known target cell for UE (2Rx) |
| 2 | Intra-frequency handover from FR2 NCD-SSB to FR2 NCD-SSB; unknown target cell for UE (2Rx) |
| ~~3~~ | ~~Inter-frequency handover from FR2 CD-SSB to FR2 NCD-SSB; unknown target cell for UE (2Rx)~~ |

Huawei: in our understanding in FR2 there is no 1Rx UE. Can we just pick intra-frequency test cases to save some test effort.

**Agreement:**

* Test cases list for HO test cases in FR2

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | Intra-frequency handover from FR2 CD-SSB to FR2 CD-SSB; known target cell for UE (2Rx) |
| 2 | Intra-frequency handover from FR2 NCD-SSB to FR2 NCD-SSB; unknown target cell for UE (2Rx) |

**Issue 6-2-3: NCD-SSB Measurement test cases**

* Discuss whether to follow agreement from HO, i.e. issue 6-2-1.
* Test cases list baseline (CMCC, Nokia)

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | SA event triggered reporting tests without gap under non-DRX (1Rx, 2Rx) |
| 2 | SA event triggered reporting tests with per-UE gaps under non-DRX (1Rx, 2Rx) |
| 3 | SA event triggered reporting tests without gap under non-DRX with SSB index reading (1Rx, 2Rx) |
| 4 | SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading (1Rx, 2Rx) |

**Discussion:**

Ericsson: we have 6 tests for intra-frequency. Test caes list was agreed in the last meeting. There are 2 test cases other than the list which are for CD-SSB.

Qualcomm: these test cases will be tested only with NCD-SSB but not with CD-SSB.

**Agreement:**

* Test cases list for NCD-SSB measurement test cases

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | SA event triggered reporting tests without gap under non-DRX (1Rx, 2Rx) |
| 2 | SA event triggered reporting tests with per-UE gaps under non-DRX (1Rx, 2Rx) |
| 3 | SA event triggered reporting tests without gap under non-DRX with SSB index reading (1Rx, 2Rx) |
| 4 | SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading (1Rx, 2Rx) |

**Issue 6-2-4: BWP switching test cases**

* Discuss whether to define BWP switching test cases with NCD-SSB as proposed by CMCC.
* Test cases list baseline (CMCC)

|  |  |
| --- | --- |
| Test Index | Test |
| 1 | DCI-based and Timer-based Active BWP Switch: NR FR1 DL active BWP switch of Cell with non-DRX in SA (1Rx, 2Rx) |
| 2 | RRC-based and Timer-based Active BWP Switch: NR FR1 DL active BWP switch with non-DRX in SA (1Rx, 2Rx) |

**Discussion:**

Moderator: the issue is whether to introduce BWP switch tests for NCD-SSB.

Qulacomm: we don’t quite understand the intention for test cases switching between CD and NCD. The typical case is to switch between CD and CD or NCD and NCD.

CMCC: switching CD and NCD is also typical. In our view NCD to NCD adds to network effort.

Qualcomm: that’s not the case for DCI based switch. It applies only to the same channel bandwidth according to RAN1/2 agreemetn.

Nokia: what’s the difference between TC1 and 2?

CMCC: 2 should be RRC based. The channel bandwidth is not changed even for switching between CD and NCD.

Qualcomm: if we include both CD and NCD within 20Mhz, we are fine with switching between CD and NCD.

Session chair: check whether the redcap UE is allowed to be configured with a BWP switching from one 20MHz to another 20MHz that is not overlapped.

Apple: DCI-based BWP switch is within UE channel bandwidth.

Intel: same view with Apple.

Vivo: RAN2 agreement is that the network avoids DCI- and timer- based BWP switches to BWP-s that are not within current channel bandwidth.

MediaTek: the BS supports 20MHz and larger BW but the UE only supports up to 20MHz. DCI-based switching is not supported between two UE channel bandwidth.

CMCC: we need to have more offline check on the issue.

Ericsson: we have to check. Our proposal in the GTW session is to specify TC for NCD-SSB.

Vivo: we do not have core requirements for switching between different UE channel bandwith.

Apple: what vivo mentions is UE CBW switch delay requirements. And it is only for RRC based.

MediaTek: we agree with vivo.

**~~Tentative Agreement:~~**

* ~~Specify BWP switching test cases for NCD-SSB.~~

**Issue 6-1-8: If NCD-SSB test cases are introduced, SMTC configuration for NCD-SSB test cases**

* Proposals
  + **Option 1 (Ericsson):** RAN4 to define the different SMTCs for NCD-SSB test cases as follow.
* **Table 9: SMTC.2 RedCap: SMTC Pattern 2 for SMTC period = 80 ms and duration = 1 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 80 ms |
| SMTC offset | 5 ms |
| SMTC duration | 1 ms |

* **Table 10: SMTC.3 RedCap: SMTC Pattern 3 for SMTC period = 40 ms and duration = 1 ms**

|  |  |
| --- | --- |
| **SMTC Parameters** | **Values** |
| SMTC periodicity | 40 ms |
| SMTC offset | 20 ms |
| SMTC duration | 1 ms |

* + **Option 2 (CMCC, Huawei):** It is suggested the NCD-SSB configuration with 80ms periodicity and 5ms offset.
  + **Option 3 (Nokia**): Introduce NCD-SSB configuration as: NCD-SSB periodicity 40ms, NCD-SSB offset [20 ms].

**Discussion:**

**Agreement:**

**Issue 6-1-2: If NCD-SSB test cases are introduced, total RF channel bandwidth for NCD-SSB test cases**

* Proposals
  + **Option 1 (Ericsson):** RAN4 to define the total RF channel bandwidth for NCD-SSB test cases as follow.
    - * In FR1, TDD SCS=30KHz: 40MHz
      * In FR1, TDD SCS=15KHz, FD-FDD SCS=15KHz, HD-FDD SCS=15KHz: 20MHz
      * In FR2, TDD SCS=120/240KHz: 100MHz

**Discussion:**

**Agreement:**

**Issue 6-1-3: If NCD-SSB test cases are introduced, dedicated BWPs and SSBs for NCD-SSB test cases**

* Proposals
  + **Option 1 (Ericsson):** RAN4 to define the dedicated BWPs/SSBs for NCD-SSB test cases as follow:
    - * Two dedicated BWPs whose BW is the half of the total RF CBW are configured without any overlapping in frequency domain.
      * CD-SSB is configured within one dedicated DLBWP, and NCD-SSB is configured within the other dedicated DLBWP.

**Discussion:**

**Agreement:**

***Performance: Issues related to RSRP offsets***

**Sub-topic 1-1:**

For all issues under sub-topic 1-1, status is summarized in table below. Check whether the table below is agreeable and further discuss the thresholds which needs more discussions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type of threshold | Threshold [dB] | Status | Options |
| 1 | *rsrp-ThresholdSSB*, | + 1 | Agreeable |  |
| 2 | *msgA-RSRP-ThresholdSSB*, | + 1 | Agreeable |  |
| 3 | *msgA-RSRP-Threshold* | + 1 | Agreeable |  |
| 4 | *absThreshSS-BlocksConsolidation* | + 1 | Agreeable |  |
| 5 | *sdt-RSRP-Threshold* | + 1 | Agreeable |  |
| 6 | *s-SearchDeltaP-r16* |  | Needs discussion | Option 1: + 1 dB  Option 2: - 1 dB  Option 3: 0dB |
| 7 | *s-SearchDeltaP-Stationary-r17* | - | Needs discussion | Option 1: + 1 dB  Option 2: - 1 dB  Option 3: 0dB |
| 8 | *s-SearchThresholdP-r16* | + 1 | Agreeable |  |
| 9 | *s-SearchThresholdQ-r16* | + 1 | Agreeable |  |
| 10 | *s-SearchThresholdP2-r17* | + 1 | Agreeable |  |
| 11 | *s-SearchThresholdQ2-r17* | + 1 | Agreeable |  |
| 12 | *Qrxlevmin* and *Qqualmin* | - | Needs discussion | Option 1: + 1 dB  Option 2: - 1 dB |

**Discussion:**

Intel: for 6 and 7, it is for relaxation and RSRP differences. To achieve liable performance, option 2 is preferred since the criteria is when RSRP change is below a threshold.

Ericsson: on 6 and 7, option 3 is against the agreement we had: the choices are between +1 and -1 dB. We supported option 1 but we are ok to compromise to option 2. For 12, we prefer option 2. There is advantage in option 2 to extend the coverage.

Huawei: for 6 and 7, the change of RSRP, the 1Rx redcap UE has larger uncertainty. For 12, we support option 1. we have concern on paging performance.

Vivo: for 6 and 7, we cannot be convinced with either + or – number. Within option 1 and 2, we prefer -1dB. For 12, we also prefer option 2.

CMCC: for 6 and 7 we prefer option 2. For 12, we prefer otpin 2 since for cell reselection the ue does raking al the time. If the coverage is not good the gain does not help much.

Nokia: we agree with Ericsson.

Apple: for 6 and 7, we prefer option 2. It is safer to avoid UE wrongly relaxes. For 12, we can compromise to option 2.

Intel: we support option 1 for 12.

MediaTel: for 12 we support option 2.

**Agreement:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type of threshold | Threshold [dB] | Status | Options |
| 1 | *rsrp-ThresholdSSB*, | + 1 |  |  |
| 2 | *msgA-RSRP-ThresholdSSB*, | + 1 |  |  |
| 3 | *msgA-RSRP-Threshold* | + 1 |  |  |
| 4 | *absThreshSS-BlocksConsolidation* | + 1 |  |  |
| 5 | *sdt-RSRP-Threshold* | + 1 |  |  |
| 6 | *s-SearchDeltaP-r16* | -1 |  |  |
| 7 | *s-SearchDeltaP-Stationary-r17* | -1 |  |  |
| 8 | *s-SearchThresholdP-r16* | + 1 |  |  |
| 9 | *s-SearchThresholdQ-r16* | + 1 |  |  |
| 10 | *s-SearchThresholdP2-r17* | + 1 |  |  |
| 11 | *s-SearchThresholdQ2-r17* | + 1 |  |  |
| 12 | *Qrxlevmin* and *Qqualmin* |  | **FFS** | Option 1: + 1 dB  Option 2: - 1 dB |

**[104-bis-e][208] NR\_redcap\_RRM\_2, AI 4.6.4 – Xusheng Wei**

**R4-2216919 Email discussion summary for [104-bis-e][208] NR\_redcap\_RRM\_2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-11**

***Core maintenance: Issues related to RRM relaxation***

**Issue 2-1-1: Clarification on RRM relaxation applying conditions**

* Proposals
  + Option 1: For the issue 2-1-3 in [R4-2215162], option 3 can be considered and the wording of option 3 could be updated. (vivo)
    - Note: option 3 is “If the UE is configured with and has fulfilled the stationary and not-at-cell-edge criteria in sections 4.2B.2.10.3 and 4.2B.2.11.3 and if UE has failed to meet the S-criterion, then the UE shall not relax measurements on any of the neighbour cells”.
  + Option 2: RAN4 to proceed along option 1 for Issue 2-1-3, i.e. UE shall not relax measurements on any of the neighbour cells in case UE has failed to meet the S criterion. (Nokia)
  + Option 3: If the UE is configured with and has fulfilled multiple relaxation criteria that allows the UE to not measure for 4 hours and if UE has failed to meet the S-criterion, then the UE shall not relax measurements on any of the neighbour cells. (Ericsson)
* Recommended WF
  + This topic has been discussed for a few meetings and any compromise is encouraged. Proponent could check whether option 1 and option 3 are identical.

**Discussion:**

**Agreement:**

4.7 Enhanced IIoT and URLLC support

4.7.1 RRM core requirement maintenance

**R4-2215873 Remaining issues for PDC enhancement**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216326 On RRM requirements for PDC enhancements**

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

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

**R4-2216327 CR on requirements for UE Rx-Tx measurement for PDC**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2626 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216422 Requirements for DRX case**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Requirements for DRX case

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

**R4-2216423 Requirements for DRX case**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2630 rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Requirements for DRX case

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

**R4-2216508 Discussion on finalization of the requirements for NR\_IIOT\_URLLC**

*Type: discussion For: Agreement  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216509 CR on requirements for NR\_IIOT\_URLLC**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2638 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216672 CR to TS 38.133 Correction to measurements core requirements for PDC**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2642 rev Cat: F (Rel-17)  
  
 Source: vivo*

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

**R4-2216721 Open issues in core requirements for RTT-based propagation delay compensation**

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

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

4.7.2 RRM performance requirements

**R4-2216510 Measurement accuracy requirements for TUE-RX**

*Type: discussion For: Agreement  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216511 CR on UE Rx-Tx time difference measurement accuracy requirements for RTT-based PDC**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2639 rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216512 Draft CR to verify measurements for UE Rx-Tx time difference measurement with TRS for RTT based PDC in FR2 SA**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2640 rev Cat: F (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216792 Draft CR to verify measurements for UE Rx-Tx time difference measurement with TRS for RTT based PDC in FR2 SA**

*Type: draftCR For: Agreement  
 38.133 v17.7.0 CR- rev Cat: F (Rel-17)  
  
 Source: Nokia Corporation*

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

4.7.2.1 General (test configurations, conditions and etc)

4.7.2.2 Measurement period and accuracy requirements

**R4-2216328 On measurement accuracy for PDC enhancements**

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

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

**R4-2216329 CR on PDC measurement accuracy requirements**

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

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

**R4-2216722 On performance requirements for RTT-based propagation delay compensation**

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

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

4.7.2.3 Test cases for FR1

4.7.2.4 Test cases for FR2

**R4-2216330 CR on TCs for PDC measurement**

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

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

4.7.4 Moderator summary and conclusions

**[104-bis-e][209] NR\_IIOT\_URLLC\_enh, AI 4.7.1 and 4.7.2 – Lars Dalsgaard**

**R4-2216920 Email discussion summary for [104-bis-e][209] NR\_IIOT\_URLLC\_enh**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-11**

***Performance: Issues related to TRS measurement accuracy requirements***

**Issue 2-1: TRS measurement accuracy requirements**

* Summary
  + Two companies have provided averaged results based on the simulation results provided in earlier meetings by companies. For most scenarios the TUE-RX accuracy with TRS, 4 samples are similar except for 30 and 60KHz SCS in FR1. Additionally, some difference in the 60KHZ and 120KHz SCS results for FR2.
  + FR1
    - Difference between the results seems to come from using different results from Nokia where R4-2216328 use [88, 68, 40, 64, 40, 32] and R4-2216510 use [32.0, 16.0, 8.0, 16.0, 8.0, 4.0] for Average TUE-RX accuracy with TRS, 4 samples, AWGN, TDD, FR1
    - Other averaged results are similar

* + FR2
    - Difference in the averaged results for 120KHz SCS with TRS BW of 64 and 128 RBs. Difference seems to from the averaging.
* Recommended WF
  + Agree on following tables with the FR2 120KHz SCS with TRS BW of 64 and 128 RBs in []:

|  |  |  |
| --- | --- | --- |
|  | | TUE-RX accuracy with TRS, 4 samples, AWGN, TDD |
| Accuracy (Tc) |
| SCS [KHz] | TRS bandwidth RB | Average |
| 15 | 24 | 103 |
| 52 | 53 |
| 104 | 26 |

* + - Average TUE-RX accuracy with TRS, 4 samples, AWGN, TDD, FR1

|  |  |  |
| --- | --- | --- |
|  | | TUE-RX accuracy with TRS, 4 samples, AWGN, TDD |
| Accuracy (Tc) |
| SCS [KHz] | TRS bandwidth RB | Average |
| 60 | 24 | 26 |
| 64 | 13 |
| 132 | 7 |
| 120 | 32 | 13 |
| 64 | [6, 7] |
| 128 | [3, 4] |

* + - Average TUE-RX accuracy with TRS, 4 samples, AWGN, TDD, FR2
  + Further discuss and agree on the TUE-RX accuracy for FR2 with 120KHz SCS with TRS BW of 64 and 128 RBs
  + Further clarify the differing results and agree on the averaged results marked FFS in the following table:

|  |  |  |
| --- | --- | --- |
|  | | TUE-RX accuracy with TRS, 4 samples, AWGN, TDD |
| Accuracy (Tc) |
| SCS [KHz] | TRS bandwidth RB | Average |
| 30 | 24 | FFS |
| 48 | FFS |
| 132 | FFS |
| 60 | 24 | FFS |
| 64 | FFS |
| 132 | FFS |

* + - Average TUE-RX accuracy with TRS, 4 samples, AWGN, TDD, FR1

**Discussion:**

**Agreement:**

**Issue 2-2: Adopt the TRS measurement accuracy requirements in Table 2 and Table 3 addition with the group delay defined in TS 38.133 – 10.1.25.2.**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussion:**

**Agreement:**

**Issue 2-3: Capture BB and RF error in the separate tables in accuracy requirements for UE Rx-Tx for PDC.**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussion:**

**Agreement:**

**Issue 2-4: Rel-16 UE Rx-Tx accuracy requirements that were derived assuming a sampling rate higher than 32∙Tc do not apply to RTT-based PDC using PRS as the DL reference signal.**

* Proposals
  + Option 1: Yes
  + Option 2: No

Question from moderator: If this proposal is agreed, does this mean RAN4 need to a new round of simulations?

Qualcomm: no.

**Discussion:**

Qualcomm: accuracy cannot go beyond the reporting granularity.

Ericsson: we can have the higher BW but keeping k = 5 reporting granularity decided by RAN1.

Huawei: we d like to confirm tha the samplilng rate does not depend on reporting granularity but only on BW of the RS. We are not sure if it is the best way to not apply any requirement or to apply same requirement between large and small BW.

Nokia: we agree with Ericsson. We need to have the requirements for higher BW and better accuracy.

**Agreement:**

**Issue 2-5: Simulation results assuming sampling rates higher than 32∙Tc will not be used to define measurement accuracy requirements for RTT-based PDC using TRS as the DL reference signal.**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussion:**

Session chair: discuss this one together with 2-4.

**Agreement:**

4.8 NR small data transmissions in INACTIVE state

4.8.1 RRM core requirement maintenance

**R4-2215877 CR on subsequent CG-SDT transmission for NR SDT**

*Type: CR For: Approval  
 38.133 v17.7.0 CR-2608 rev Cat: F (Rel-17)  
  
 Source: ZTE Wistron Telecom AB*

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

**R4-2215878 Discussion on RRM core requirements for NR SDT**

*Type: discussion For: Discussion  
 Source: ZTE Wistron Telecom AB*

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

**R4-2216331 CR on SDT RRM requirements**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2627 rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216740 CR on requirements for CG-SDT in unlicensed band**

*Type: CR For: Agreement  
 38.133 v17.7.0 CR-2643 rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

**R4-2216741 Description of the CR for CG-SDT in unlicensed band.**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

4.8.2 RRM performance requirements

**R4-2215879 Discussion on RRM performance requirements for NR SDT**

*Type: discussion For: Discussion  
 Source: ZTE Wistron Telecom AB*

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

**R4-2216332 Discussion on RRM test cases for SDT**

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

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

**R4-2216333 CR to introduce SDT RRC TCs**

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

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

**R4-2216569 Discussion on performance requirements for SDT**

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

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

**R4-2216742 Discussion on RRM performance requirement for CG-SDT**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

**R4-2216743 DraftCR for test case for CG-SDT**

*Type: draftCR For: Discussion  
 38.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

**R4-2216770 Discussions on RRM performance requirements for SDT**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss the performance part of SDT.

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

4.8.3 Moderator summary and conclusions

**[104-bis-e][210] NR\_SmallData\_INACTIVE, AI 4.8.1 and 4.8.2 – Aijun Cao**

**R4-2216921 Email discussion summary for [104-bis-e][210] NR\_SmallData\_INACTIVE**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

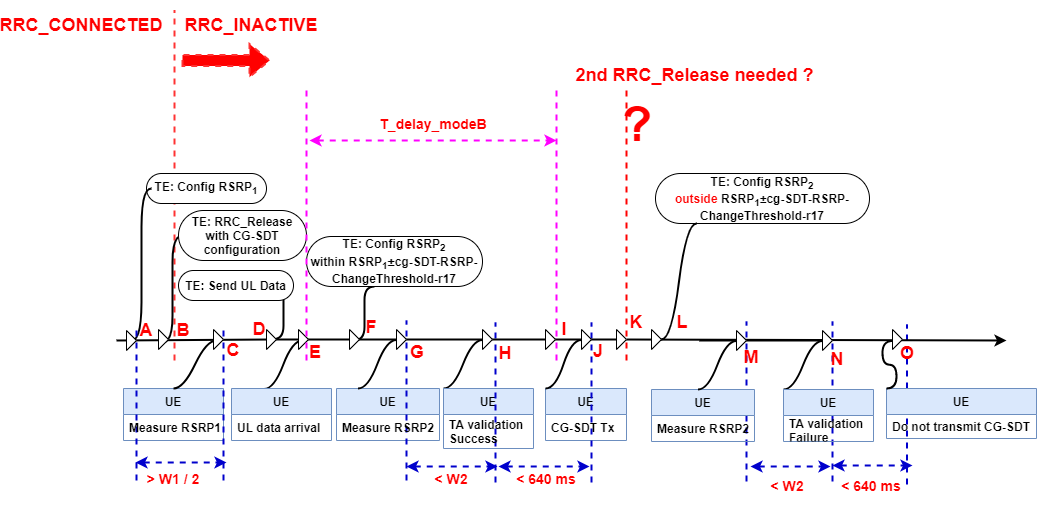
**Conclusions after 2nd round**

**GTW on Oct-12**

***Performance: Sub-topic 2-1 Time points in one CG-SDT test case***

*Since there are two sub-test-cases (previous terms TC#1+TC#3 for FR1, and TC#2+TC#4 for FR2) in one test, time points should be clearly defined.*

*By consolidating all of the tdocs discussing the time points, Moderator suggests to define the time points by the moments when either TE or UE takes actions, and start with the following time line:*

**

**Issue 2-1-1: Consider the following time points for CG-SDT RRM test cases as shown in Fig. 1, define time points as:**

* Proposals
  + Option 1:
    - Time point A: TE to configure RSRP1
    - Time point A’: configuration of test loopback modeB
    - Time point B: TE to send RRC\_Release with CG-SDT configuration
    - Time point C: UE to measure RSRP1
    - Time point D: TE to send UL data to UE
    - Time point E: UE UL data arrival
    - Time point F: TE to configure RSRP2 within RSRP1 ±cg-SDT-RSRP-ChangeThreashold-r17
    - Time point G: UE to measure RSRP2
    - Time point H: UE to perform TA validation
    - Time point I: T\_delay\_modeB expiry
    - Time point J: UE to perform CG-SDT transmission
    - Time point L: TE to configure RSRP2 outside RSRP1 ±cg-SDT-RSRP-ChangeThreashold-r17
    - Time point M: UE to measure the new RSRP2
    - Time point N: UE to perform a second TA validation
    - Time point O: UE not to transmit CG-SDT
    - Time point O’: TE end point of receiving UE CG-SDT
  + Option 2: Any other, please elaborate.
  + Option 3 (new): To be discussed as part of the Sub-topic 2-3

**Discussion:**

Nokia: 1. It is related to the discussion of whether to have test where we can verify measurement taken outside the window or not. Regarding the time window shown here, the TE does not know when the UE starts to measure RSRP2, but the TE knows where the ending point of the window. If we make all the times related to CG\_SDT window and RRC realese command, it is easier for the TE to control the whole process. 2. How do we understand modeB from RAN5: the TE starts modeB and when the modeB expires the UE will flush the configuration so I should be before G. 3. One question is whether to send 2 different SDT Tx. The UE needs to be in connected mode so between G and O the UE needs to go into connected mode to receive the CG-SDT command. But it is against the intention of this design which is UE not going into connected mode.

Huawei: the actions from the UE side cannot be controlled and they are not specified in the spec in the tests. The first session is between A and J which we focus now in this discussion. We think D should be before B since the data can only be transmitted in connected mode. Further E is not needed since we only care about when the timer expires which is I. H should be after I though not specified. G can be either before I or after I.

Qualcomm: similar comments with Huawei. UL data should be before B. we may consider to define the end point of the measurement window with its relation with expiry point.

Ericsson: we have similar comments with Huawei. We should focus on the first session/process which is before J. RSRP1 should be acquired again after J in the second session. We need to separate the two processes for now.

MediaTek: we have same view as Huawei. We have concern regarding periods between A and C since TE does not know the points. B can be the start of Window 1 and C can be anywhere within the Window 1. Same applies to RSRP2. Regarding subtests, we have sub1 and sub2. For sub2 we don’t need to have 2nd release command since we don’t need to go to the connected mode and UE triggers the 2nd SDT Tx. We don’t need O since we don’t need to check if the UE does not transmit.

Apple: for the additional part, we agree with moderator that we need to understand modeB. In RAN4 we can in general specifies that the point is when UE has UL transmission data in the buffer, and leave it to RAN5 to specify the details. For F and L, when TE configures RSRP2 on top of this figure, measuremtn accuracy needs to be considered in the margin. The measurement window design is not aligned with serving cell measurement period.

ZTE: 1. To Nokia point I should be after E. 2. It is not necessary for the UE to go back into connected between the sessions. The UE receives the release command in inactive mode. 3. How to capture the UE points needs further discussion. When UE receives UL scheduling, point E is the starting of the timer. If not we can remove E. and H is after I. 4. We can first focus on the first session we agree. 5. 2nd realese command is needed to trigger the 2nd Tx SDT. O will not be defined since it is a UE point. 6. RSRP margin from accuracy is a good point.

Nokia: TA measurement may happen before or after I. 2nd release command is definitely needed since the two sessions are considered as the same sequence and there is no 2nd validation according to RAN2 spec. O is needed as the end point from the TE perspective.

Ericsson: removing O is not a good approach. Subtest 2 is to verify UE not transmiting SDT.

MediaTek: we agree with O’.

**Agreement:**

**Issue 2-1-2: Whether or not is a second RRC\_Release needed before TE changes RSRP level in the second sub-test-case, i.e., whether or not to introduce Time point K shown in Fig. 1?**

* Proposals
  + Option 1: Yes
  + Option 2: No, as long as config two CG-SDT resources in the first RRC\_Release

**Discussion:**

Huawei: we agree that 2nd release is needed.

Qualcomm: we prefer to hold this discussion until RAN5 confirms. It is possible that TE can confiure two UL data for two independent CG-SDT configurations in the first release command.

ZTE: we need this agreement.

Nokia: send the LS to RAN5 asking how the two subtests can be implemented together.

**Agreement:**

* A second RRC\_Release command is needed before the second sub-test-case.

**Issue 2-1-3: Which one comes first for sub-test #1 (i.e., when UE shall transmit) and sub-test #2 (i.e., when UE shall not transmit)?**

* Proposals
  + Option 1: Sub-test #1 comes first when UE shall transmit.
  + Option 2: Sub-test #2 comes first when UE shall not transmit.
  + Option 3: It does not matter which one comes first.

**Discussion:**

**Agreement:**

**Issue 2-1-4: Whether or not to configure RA-SDT in the test of CG-SDT?**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussion:**

**Agreement:**

**Issue 2-1-5: Whether or not to introduce subsequent CG-SDT transmission in the sub-test with a confirmed TA validation?**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussion:**

**Agreement:**

5 Rel-18 spectrum related WIs for NR

6 Rel-18 non-spectrum related work items and study items for NR

6.8 Requirement for NR FR2 multi-Rx chain DL reception

6.8.3 RRM core requirements for simultaneous DL reception from different directions

**R4-2215710 Discussions on FR2 multi Rx chain DL reception**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: NTT DOCOMO, INC.*

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

6.8.3.1 Analysis of RRM impacts and general aspects

**R4-2215360 Discussion on FR2 multi Rx chain RRM impacts and general aspects**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215462 on the multi-RX chain general aspects**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215622 General aspects for NR FR2 multi-Rx chain DL reception**

*Type: discussion For: Approval  
 Source: Apple*

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

**R4-2215720 Discussion on general aspects for FR2 multi-Rx chain DL reception**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215759 Discussion on simultaneous DL reception from different directions for general issues**

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

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

**R4-2215803 Discussion on general aspects of RRM for simultaneous DL reception from different directions**

*Type: discussion For: Discussion  
 Source: LG Electronics Inc.*

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

**R4-2215812 Discussion on general requirements for FR2\_multiRX\_DL**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215867 Further analysis on RRM impacts and general aspects**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216285 Discussion on RRM general impacts for R18 FR2 multi-Rx chain DL reception**

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

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

**R4-2216474 Discussion on general aspects on RRM requirements for simultaneous DL reception from different directions**

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

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

**R4-2216578 General considerations on RRM requirements for multi-RX RRM**

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

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

**R4-2216713 Further Analysis of RRM requirement impacts for simultaneous DL reception from different directions**

*Type: discussion For: Discussion  
 Source: Samsung*

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

**R4-2216824 Discussion on scenarios for simultaneous DL reception from different directions**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss scenarios for simultaneous DL reception from different directions

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

**R4-2216866 Impacts on RRM to support FR2 multi-Rx chain based 4 layer DL reception from multi-TRP**

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

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

6.8.3.2 L3 measurement

**R4-2215464 on the multi-RX chain L3 measurement**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215623 On L3 measurements for NR FR2 multi-Rx chain DL reception**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215722 Discussion on L3 measurement for FR2 multi-Rx chain DL reception**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215760 Discussion on simultaneous DL reception from different directions for L3 measurement**

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

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

**R4-2215804 Discussion on L3 measurement related RRM for simultaneous DL reception from different directions**

*Type: discussion For: Discussion  
 Source: LG Electronics Inc.*

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

**R4-2215813 Discussion on L3 requirements for FR2\_multiRX\_DL**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215868 On L3 measurement for multi-Rx chain**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216286 Discussion on L3 measurement impacts for R18 FR2 multi-Rx chain DL reception**

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

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

**R4-2216476 Discussion on L3 part RRM requirements for simultaneous DL reception from different directions**

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

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

**R4-2216579 Discussion on RRM L3 enhancements for multi Rx DL in FR2**

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

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

**R4-2216825 Discussion on L3 measurements and procedures**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss L3 measurmeent requirements and procedures

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

6.8.3.3 L1 measurement

**R4-2215361 Discussion on RRM impacts for L1 measurement based on FR2 multi Rx chain**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215463 on the multi-RX chain L1 measurement**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215624 On L1 measurements for NR FR2 multi-Rx chain DL reception**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215721 Discussion on L1 measurement for FR2 multi-Rx chain DL reception**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215761 Discussion on simultaneous DL reception from different directions for L1 measurement**

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

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

**R4-2215805 Discussion on L1 measurement related to RRM for simultaneous DL reception from different**

*Type: discussion For: Discussion  
 Source: LG Electronics Inc.*

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

**R4-2215814 Discussion on L1 requirements for FR2\_multiRX\_DL**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215869 On L1 measurement for multi-Rx chain**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216287 Discussion on L1 measurement impacts for R18 FR2 multi-Rx chain DL reception**

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

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

**R4-2216475 Discussion on L1 part RRM requirements for simultaneous DL reception from different directions**

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

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

**R4-2216580 Discussion on RRM L1 enhancements for multi Rx DL in FR2**

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

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

**R4-2216826 Discussion on L1 measurements and procedures**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss L1 measurmeent requirements and procedures

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

6.8.3.4 TCI state switching

**R4-2215362 Discussion on RRM impacts for TCI state switching based on FR2 multi Rx chain**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215465 on the multi-RX chain TCI state switching**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215762 Discussion on simultaneous DL reception from different directions for TCI state switching**

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

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

**R4-2215806 Discussion on TCI state switching for simultaneous DL reception from different directions**

*Type: discussion For: Discussion  
 Source: LG Electronics Inc.*

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

**R4-2215815 Discussion on TCI state switching for FR2\_multiRX\_DL**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215870 On TCI state switching for multi-Rx chain**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216277 Discussion RRM requirements of TCI state switching for multi-Rx**

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

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

**R4-2216477 Discussion on TCI state related RRM requirements for simultaneous DL reception from different directions**

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

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

**R4-2216581 Discussion on RRM TCI State Switching for multi Rx DL in FR2**

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

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

**R4-2216827 Discussion on active TCI state requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss TCI state switch requirements for different QCl type-D

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

6.8.4 Moderator summary and conclusions

**[104-bis-e][211] FR2\_multiRx\_RRM\_part1, AI 6.8.3, 6.8.3.1 and 6.8.3.2 – Qian Yang**

**R4-2216922 Email discussion summary for [104-bis-e][211] FR2\_multiRx\_RRM\_part1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**[104-bis-e][212] FR2\_multiRx\_RRM\_part2, AI 6.8.3.3 – Valentin Gheorghiu**

**R4-2216923 Email discussion summary for [104-bis-e][212] FR2\_multiRx\_RRM\_part2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**[104-bis-e][213] FR2\_multiRx\_RRM\_part3, AI 6.8.3.4 – Venkatarao Gonuguntla**

**R4-2216924 Email discussion summary for [104-bis-e][213] FR2\_multiRx\_RRM\_part3**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

6.9 Even Further RRM enhancement for NR and MR-DC

6.9.1 General and work plan

**R4-2215599 Updated Work plan for R18 eFeRRM**

*Type: Work Plan For: Agreement  
 Source: Apple*

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

6.9.2 RRM core requirements for FR2 SCell activation delay reduction

**R4-2215456 Discussion on FR2 SCell activation delay reduction**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215801 Discussion on FR2 SCell activation delay reduction**

*Type: discussion For: Discussion  
 Source: LG Electronics Inc.*

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

**R4-2215807 Discussions on FR2 SCell Activation delay requirements**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: NTT DOCOMO, INC.*

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

**R4-2216744 Discussion on RRM requirements for FR2 unknown Scell activation delay reduction**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm Incorporated*

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

6.9.2.1 L3 part enhancement for FR2 SCell activation

**R4-2215356 Discussion on L3 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215530 Discussion on A-TRS based unknown SCell activation**

*Type: discussion For: Discussion  
 Source: China Telecom*

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

**R4-2215600 On L3 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

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

**R4-2215719 Discussion on L3 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215785 L3 part enhancement on FR2 SCell activation delay reduction**

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

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

**R4-2215809 Discussion on L3 part enhancement for FR2 Scell activation delay reduction**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

**Abstract:**

L3

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

**R4-2215865 Discussion on L3 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216272 Discussion on L3 enhancement for FR2 SCell activation delay reduction**

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

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

**R4-2216480 Discussion on the L3 part enhancement of RRM requirements for FR2 SCell activation delay reduction**

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

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

**R4-2216758 Discussion on L3 part enhancement for FR2 SCell activation**

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

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

**R4-2216828 Discussion on L3 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss L3 part of enhancements for SCell activation

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

6.9.2.2 L1 part enhancement for FR2 SCell activation

**R4-2215357 Discussion on L1 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215601 On L1 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

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

**R4-2215718 Discussion on L1 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215786 L1 part enhancement on FR2 SCell activation delay reduction**

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

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

**R4-2215810 Discussion on L1 part enhancement for FR2 Scell activation delay reduction**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

**Abstract:**

L1

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

**R4-2215866 Discussion on L1 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216273 Discussion on L1 enhancement for FR2 SCell activation delay reduction**

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

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

**R4-2216479 Discussion on the L1 part enhancement of RRM requirements for FR2 SCell activation delay reduction**

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

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

**R4-2216759 Discussion on L1 part enhancement for FR2 SCell activation**

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

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

**R4-2216829 Discussion on L1 part enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss L1 part of enhancements for SCell activation

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

6.9.2.3 Other potential enhancement for FR2 SCell activation

**R4-2215531 Discussion on SCell activation without SSB in inter-band scenario**

*Type: discussion For: Discussion  
 Source: China Telecom*

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

**R4-2215787 Other enhancements on FR2 SCell activation delay reduction**

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

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

**R4-2216274 Discussion on FR2 SCell activation delay reduction**

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

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

**R4-2216478 Discussion on other aspects of RRM requirements enhancement for FR2 SCell activation delay reduction**

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

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

**R4-2216760 Discussion on other potential enhancement for FR2 SCell activation**

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

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

**R4-2216830 Discussion on Other potential enhancement for FR2 SCell activation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss other potential enhancements

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

6.9.3 RRM core requirements for FR1-FR1 NR-DC

**R4-2215355 Discussion on FR1-FR1 NR-DC**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215466 Discussion on RRM core requirements for FR1-FR1 NR-DC.**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215602 On RRM requirements for FR1-FR1 NR-DC**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Apple*

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

**R4-2215717 Discussion on RRM requirements for FR1-FR1 NR-DC**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215763 Discussion on R18 RRM for FR1-FR1 NR-DC**

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

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

**R4-2215811 Discussion on RRM requirements for FR1-FR1 NR-DC**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

**Abstract:**

FR1-FR1 NR-DC

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

**R4-2215837 discussion on FR1-FR1 NR-DC**

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

**Abstract:**

discussion on FR1-FR1 NR-DC requirements

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

**R4-2215864 Further discussion on FR1-FR1 NR-DC requirement**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216275 Discussion RRM requirements for FR1-FR1 NR-DC**

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

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

**R4-2216341 Discussion on RRM core requirements for FR1-FR1 NR-DC**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution presents views on FR1-FR1 NR-DC RRM core requirements

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

**R4-2216745 Discussion on RRM requirements for remaining issues about FR1+FR1 NR-DC**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm Incorporated*

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

6.9.4 Moderator summary and conclusions

**[104-bis-e][214] NR\_RRM\_enh3\_part1, AI 6.9, 6.9.1 and 6.9.2 – Jie Cui**

**R4-2216925 Email discussion summary for [104-bis-e][214] NR\_RRM\_enh3\_part1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-14**

**FR2 SCell activation**

**Issue 2-1-1: Scenarios/status/categories for FR2 SCell activation enhancement**

* Proposals
  + Option 1 (Qualcomm):
    - Unknown SCell in FR2 needs to split in two categories for FR2 SCell activation delay reduction purpose. 1) completely unknown SCell, 2) semi-unknown SCell.
    - SCell activation delay reduction should be applied for semi-unknown SCell scenario where SCell is activated from deactivated state.
    - Optional UE capability to indicate the required SSBs to be measured during AGC and cell search before RSRP reporting from UE side for semi-unknown scenario.
  + Option 2 (Nokia):
    - The availability of a valid L3 measurement result at the time of SCell activation shall be considered to reduce the SCell activation delay.
    - The UE indication on the up-to-date L3 measurement status of the to-be-activated SCell is introduced to reduce the FR2 unknown SCell activation delay.
  + Option 3 (Ericsson):
    - RAN4 to discuss and specify SCell activation for following two cases.
      * Scenario1: SCell is unknown due to the fact that UE did not sent measurement report to gNB in last X seconds.
      * Scenario2: SCell is unknown due to the fact that UE may be measuring it for first time.
  + Option 4 (last meeting agreement): RAN4 to prioritize at least FR2 unknown SCell delay reduction in the 1st phase of the WI
    - FR2 unknown Scell without intra-band serving cell is considered for 1st phase.
    - The extension of the enhancement solutions to FR1 can also be discussed.
* Recommended WF
  + Please companies discuss whether the FR2 SCell activation enhancement shall be limited to certain UE scenario/status/category as option 1/2/3 or shall be for generic FR2 unknown Scell without intra-band serving cell?
  + Or it shall be discussed case by case (e.g., sample number reduction may consider such scenario/status/category but Rx beam sweeping factor reduction may not. This “e.g.” is just an example, but not a proposal)?

*Recommendations for 2nd round:*

Moderator:

In order to find a middle ground for discussion, we try to keep option 4 (existing agreement) as baseline and also to make sure companies can discuss the further categorization in a case-by-case way. In this issue 2-1-1, moderator encourage proponents of option 1/2/3 to consolidate the UE category in this meeting, and we can use this new UE category to discuss in the following enhancement issues to determine whether and how to use this new category for enhancement.

Based on the above analysis, moderator propose a new option 5:

* Option 5 (Moderator):
  + RAN4 to use option 4 as baseline to discuss the enhancement, and the new UE categorization based on option 1/2/3 can be discuss case-by-case in enhancement issues to determine whether and how to use such new category for enhancement.

Recommend to discuss it in GTW and 2nd round, agreements will be captured in the WF.

**Discussion:**

Moderator suggests that R4-2216744 is presented.

Pivotal:

Ericsson: we kind of agree that we need further classify. Semi unknown concept needs further clarification. The delay reduction for semi unknown and complete unknown both are considered.

Nokia: UE may have had measured the SCell there is possibility in optimizing the delay due to that. If the SCell is considered as semi known there is more room for optimization. On UE category, is it category? It is more about scenario category rather than UE category.

Huawei: it is related to particular sultions to talk about category. There is no need to have a high level category at this stage. We agree with the moderator proposal and WF.

MediaTek: we agree with the moderator proposal.

China Telecom: we agree with option 5 from the moderator.

Apple: we are fine to change UE categorization to a better wording. One comment on the paper, compared with the existing known condition, here if the UE doesn’t report the network doesn’t know whether the UE is in known or semi or unknown case. Maybe we could ues UE indication. In general we agree with the idea of categorization to help optization on the delay performance.

LGE: we are fine with the moderator proposal. To clarify on ‘case by case’, we need to define new known condition?

ZTE:

Qualcomm: we are not proposing new known conditions. We propose the framework itself. It is about how to reduce the delay in general. Based on RSRP reporting, there is room for the reduction. We start from this framework and we can discuss the details further.

Intel: we understand the idea from Qualcomm. We are fine with that. How to define reduction, we need to confirm the side conditions.

Vivo: we are fine with further discussing option 1/2/3. Reporting to network is a way to align the understanding. And we are also thinking about the way to allow transactions between network and UE based on new types of known condition and requirements related.

Xiaomi: we support option 5 from the moderator. We are also fine with the framework from Qualcomm. The intention is to figure out the cases to facilitate the reduction discussions. RAN4 should focus on the conditions and potential reductions.

CMCC: we support option 4 and 5. One thing is that the edn point is UE transmiting CSI report. The network does not need to tell if this is unknown or semi-unknown condition.

Nokia: let’s try to agree on that measurement status in deactivated state needs to be considered.

Apple: condition category is used in some cases but not in other cases. If the network could not know, how do we verify the UE behaviours in the tests. If network knows clearly, it can setup suitable timers and it saves time for the network to wait. On measurement status, the term need further discussion. In this meeting a general idea is good enough. On the framework from Qaulcomm, it is difficult to converge in the summary. There are too many combos in one time line since for each component there are number of choices. In the future discussion, if one thinks there is relation between aft and bofre components, please indicate.

Huawei: option 1/2/3 are different level with 4 and 5. On the agreement, we propose a change in wording to make it more general.

OPPO: we confirm that we agree with Huawei proposal to remove detailed wording.

Intel: to CMCC, since in legacy requirements, the UE perform Rx sweeping and report beam. Network reacts to this. There are interactions.

Qualcomm: we are ok to consider options other than 1/2/3. We are fine to discuss to find the best solution to reduce the delay. We focus more on fast report from the UE. The network provides chance for UE reporting early.

**Agreement:**

* + RAN4 to use option 4 as baseline to discuss the enhancement, and further unknown SCell scenario categorization ~~based on option 1/2/3~~ can be discussed case-by-case in enhancement issues to determine whether and how to use such new category for enhancement.
  + Option 4 (last meeting agreement): RAN4 to prioritize at least FR2 unknown SCell delay reduction in the 1st phase of the WI
    - FR2 unknown Scell without intra-band serving cell is considered for 1st phase.
    - The extension of the enhancement solutions to FR1 can also be discussed.

**Issue 2-2-2: Beam sweeping factor enhancement related with WI of FR2 multi-Rx chain DL reception**

* Proposals
  + Option 2 (Intel): Don’t need to consider to leverage conclusions from multi-Rx chain DL reception WI to FR2 SCell activation enhancement in R18 eFeRRM WI at least in 1st phase.
  + Option 3 (Apple, CMCC, OPPO, MediaTek): RAN4 will discuss whether or how to leverage conclusions from multi-Rx chain DL reception WI to FR2 SCell activation enhancement in R18 eFeRRM WI if the multi-Rx chain DL reception WI has corresponding conclusions for measurement delay reduction of single carrier case.
  + Option 4 (ZTE): For the UE capable of 2 panels, the conclusion on the measurement delay reduction in WI of FR2 multi-panel Rx can be applied to the L3 procedure in FR2 SCell activation. Since the WI of FR2 multi-panel Rx is also discussed in parallel, so we can first discuss the SCell activation without considering multi-panel Rx.
  + Option 5 (Ericsson): RAN4 to agree to apply relevant agreements of multi-RX chain to SCell activation delay too, if the UE supports this capability.

*Recommendations for 2nd round:*

Based on the 1st round discussion, moderator proposed an option 6 to merge the option 2 and 3.

* Option 6 (moderator):
  + In 1st phase, RAN4 not to consider to leverage conclusions from multi-Rx chain DL reception WI to FR2 SCell activation enhancement in R18 eFeRRM WI.
  + In 2nd phase, if the multi-Rx chain DL reception WI has corresponding conclusions for measurement delay reduction of single carrier case, RAN4 to discuss whether or how to leverage conclusions from multi-Rx chain DL reception WI to FR2 Scell activation enhancement in R18 eFeRRM WI.

Recommend to discuss it in GTW and 2nd round. To facilitate the 2nd round discussion, I only kept the options explicitly supported by companies in 1st round, but companies can still retrieve the 1st round options if they want in 2nd round. Agreement will be captured in the WF.

**Discussion:**

**Agreement:**

**Issue 2-2-1: Beam sweeping factor enhancement in L3 part of FR2 unknown SCell activation (not related with WI of FR2 multi-Rx chain DL reception)**

* Proposals
  + Option 1 (Xiaomi, Intel, Apple, CMCC, Ericsson, OPPO, vivo): RAN4 to introduce the UE capability to support the UE Rx beam sweeping factor less than 8 for FR2 SCell activation.
    - Option 1a (CMCC): for RX beam sweeping factor reduction, the agreements on reduced RX beam sweeping factor for Rel-17 FR2 HST or Rel-17 positioning enhancement can be considered as baseline.
    - Option 1b (vivo): Introduce the UE capability to support Rx beam sweeping factor can be less than 8 (i.e., 1, 2, 4, 6) for AGC settling and cell detection during unknown FR2 SCell activation.
  + Option 2 (Xiaomi): RAN4 to introduce the state of not performing full Rx beam sweeping for L3 measurement during FR2 SCell activation.
    - When the measured RSRP is higher than a threshold, the UE enters in the state of not performing full Rx beam sweeping. The UE can perform the measurement with a sub-set of Rx beam or non-Rx beam sweeping during this state.
    - When RSRP variance is larger than a threshold, the UE exits the non-changing Rx beam state and perform the full Rx beam sweeping.
  + Option 3 (LGE):
    - P1-1: Perform L3 (cell synchronization, measurement,…) with reduced Rx beam sweeping (e.g., rough Rx beam), and then perform L1-RSRP with reduced Rx beam sweeping (e.g., narrow beam sweeping corresponding to selected rough Rx beam)
    - P1-2: Perform L3 (cell synchronization, measurement,…) with full Rx beam sweeping (e.g., narrow Rx beam), and then skip the L1-RSRP procedure
  + Option 5 (ZTE):
    - Directly reduce the Rx beam number from 8 to [x] for each component in L3 part, but the corresponding performance loss would be verified to be acceptable.
  + Option 7 (MediaTek):
    - Since L3 part is the first procedure after RF retuning, reducing RX beam sweeping factor at this stage could have negative impact on the performance of AGC and cell search procedure, which is a significant sacrifice to enhance the SCell activation delay.
  + Option 9 (Qualcomm): from on option1 in Issue 2-1-1,
    - Optional UE capability to indicate the required SSBs to be measured during AGC and cell search before RSRP reporting from UE side for semi-unknown scenario.

*Recommendations for 2nd round:*

Recommend to discuss it in GTW and 2nd round. To facilitate the 2nd round discussion, I only kept the options explicitly supported by companies in 1st round, but companies can still retrieve the 1st round options if they want in 2nd round. Agreement will be captured in the WF.

For proponents of option 5, please check if you can compromise to option 1, since the FR2 SCell activation enhancement itself can be an optional feature in moderator’s view and then option 5 can be treated as a sub-option under option 1.

As commented by other companies, this issue is also related with issue 2-1-1 (sub-category of pure-unknown or semi-unknown), moderator suggestion is we can also discuss those sub-category in this issue to see if Rx beam reduction enhancement rely on such sub-category or not.

**Discussion:**

**Agreement:**

**[104-bis-e][215] NR\_RRM\_enh3\_part2, AI 6.9.3 – Roy Hu**

**R4-2216926 Email discussion summary for [104-bis-e][215] NR\_RRM\_enh3\_part2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-14**

**FR1+FR1 NR-DC**

**Issue 1-1-1: Applicability of the existing requirement for FR1+FR1 NR-DC**

* Proposals
  + Option 1:

For requirements explicitly listed in the WID:

* + - If applicability mentioned FR1+FR2 NR-DC in existing spec, add FR1+FR1 NR-DC applicability;
    - If there is no applicability rules mentioned FR1+FR2 NR-DC, no need to add/modify the applicability;

For requirements not listed in the WID:

* + - Skip the requirements without spec changes unless impact is identified.

*Tentative agreements:*

For the features/requirements that have already supported and stated FR1+FR1 NR-DC

* + keep current applicability rules as they are.

For requirements explicitly listed in the WID:

* If applicability is applied for FR1+FR2 NR-DC in existing spec, add FR1+FR1 NR-DC applicability;
* If no applicability is applied for FR1+FR2 NR-DC, no need to add/modify the applicability;

*Candidate options:*

For requirement not listed in the WID,

* Option 1(Intel): If it can be applied for FR1+FR2 NR-DC, check whether it can apply for FR1-FR1 NR DC. If yes, some applicability update may be needed. Otherwise, not applicable to FR1-FR1 NR-DC.
* Option 2(OPPO, MTK, QC, Apple): Not applicable to FR1-FR1 NR-DC, i.e. no UE requirement applies. Any extension of scope needs to be discussed in RAN-P.
* Option 3(vivo): Further Check whether there need any additional changes at drafting CR stage.
* Option 4: Need more clarification.

**Discussion:**

Nokia: we are fine in general approach. We prefer to have rewording on the option. Case by case manner should be considered for each of the requirements.

Ericsson: regarding applicability, we are fine with the approach mainly reusing and adding on. On requirements not listed, there is already agreement that we don’t include anything of that. FR1+ FR2 Tprocessing is different from FR1+FR1.

Huawei: on requirements not mentioned in the WID, how to handle the basic requirements like timing?

Qualcomm: similar views with other companies on how to reuse FR1+FR2 requiremtns to FR1+FR1. On requirements not listed in the WID, maybe we need to go to plenary. Before that we should focus on the WID.

Vivo: for requirements not listed, let’s first identify them. We could use applicability to solve it without going to RANP. For features we could go to RANP.

Intel: we are wondering for the other features if they support FR1+FR1, do we need applicabity specifications?

MediaTek: we support option2 in candidate options.

Apple: to clarify on features not listed, R15 and R16/17 features are divided in the WID. R15 features are not excluded. For R16/17 features which are in scope are clearly listed and others are not in the scope.

OPPO: we should focus on the cases though not listed but support FR1+FR1 and go to RANP to discuss.

**Agreement:**

For the features/requirements that have already been complied with FR1+FR1 NR-DC

* keep current applicability rules as they are.

For requirements explicitly listed in the WID:

* If applicability rules are specified for FR1+FR2 NR-DC requirements in the existing spec ~~(e.g., reusing CA requirements)~~, applicability rules for FR1+FR1 NR-DC requirements are also specified;
* ~~If no applicability is applied for FR1+FR2 NR-DC, no need to add/modify the applicability;~~

**Issue 1-3-2: UE preparation time for FR1-FR1 NR-DC conditional Pscell additional delay**

* Proposals
  + Option 1: UE preparation time shall be shorter due to the PScell is within the same FR group with Pcell, and TUE\_preparation= 8ms.

**Discussion:**

**Agreement:**

**Issue 1-5-1: Measurement restriction**

* Proposals
  + Option 1(Apple): the existing measurement restriction requirement can be reused for FR1-FR1 NR-DC scenario.
  + Option 2(Nokia): No measurement restriction is needed for NR-DC scenario including FR1+FR1 and FR1+FR2.

**Discussion:**

**Agreement:**

**Issue 1-7-2: Additional uncertainty delay**

* Proposals
  + Option 1(Nokia): Additional uncertainty delay for collision between PCell RACH and PSCell RACH occasion need to be counted in HO with PSCell delay requirements and follow the agreement in R17 HO with PSCell to support FR1+FR1 to FR1+FR1 NR-DC

**Discussion:**

**Agreement:**

6.10 Further enhancements on NR and MR-DC measurement gaps and measurements without gaps

6.10.1 General and work plan

6.10.2 RRM core requirements for pre-configured MGs, multiple concurrent MGs and NCSG

**R4-2215367 Discussion on RRM requirements for pre-configured MGs, multiple concurrent MGs and NCSG**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215426 Discussion on RRM requirements for combination of pre-MG, concurrent MGs and NCSG**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215457 RRM requirement for the combination of concurrent gaps, pre-MG and NCSG**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215610 On R18 gap enhancement - joint configuration of Pre-MG, NCSG and concurrent gaps**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215714 Discussion on combination of pre-configured MGs, multiple concurrent MGs and NCSG**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215821 Discussion on joint requirements for PreMG, concurrent MGs and NCSG**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215966 Considerations on pre-configured MGs, multiple concurrent MGs and NCSG**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216336 Discussion on joint working of eMG features**

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

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

**R4-2216460 Discussion on PreMG, ConMG, NCSG**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the requirement for Pre-MG, ConMGs and NCSG

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

**R4-2216482 Discussion on RRM requirements for joint considerations between pre-MG, concurrent MG and NCSG for NR and MR-DC**

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

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

**R4-2216582 Discussion on requirements for concurrent measurement gaps, pre-configured gaps and NCSG**

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

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

**R4-2216723 On joint requirements for Rel-17 measurement gap enhancements**

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

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

**R4-2216737 RRM core requirements for pre-configured MGs, multiple concurrent MGs and NCSG**

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

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

6.10.3 RRM core requirements for measurements without gaps

**R4-2216746 Discussion on RRM requirements for measurement without gap**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Qualcomm Incorporated*

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

6.10.3.1 Measurement without gaps for UEs reporting NeedForGapsInfoNR

**R4-2215368 Discussion on measurements without gaps when UE reporting NFG**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215427 Discussion on RRM requirements for measurement without gaps for UEs reporting NeedForGapsInfoNR**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215467 Discussion on RRM requirements for measurement without gaps for UEs reporting NeedForGapsInfoNR**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215611 On R18 gap enhancement - NeedForGap**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215715 Discussion on measurements without gaps for UEs reporting NeedForGapsInfoNR**

*Type: discussion For: Information  
 Source: CMCC*

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

**R4-2215822 Discussion on measurement without gaps for UEs reporting NeedForGapsInfoNR**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215967 Considerations on measurement without gaps for UEs reporting NeedForGapsInfoNR**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216337 Discussion on requirements for NeedForGaps**

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

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

**R4-2216461 Discussion on NeedForGaps measurement**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the NeedForGaps measurement requirement

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

**R4-2216484 Discussion on measurement without gaps for UEs reporting NeedForGapsInfoNR**

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

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

**R4-2216583 Discussion on RRM requirements without gaps for MG\_enh2**

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

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

**R4-2216738 Discussion on measurement without gaps for UEs reporting NeedForGapsInfoNR**

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

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

6.10.3.2 Inter-RAT measurement without gap

**R4-2215369 Discussion on inter-RAT measurement without gaps**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215428 Discussion on RRM requirements for Inter-RAT measurement without gap**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215468 Discussion on RRM requirements for inter-RAT measurement without gap**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215612 On R18 gap enhancement - inter-RAT measurement with gap**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215716 Discussion on inter-RAT measurements without gaps**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215823 Discussion on RRM requirements for interRAT measurements without gaps**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215968 Considerations on inter-RAT measurement without gap**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216338 Discussion on inter-RAT MG-less measurement in feMG**

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

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

**R4-2216462 Discussion on Inter-RAT measurement without gap**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the inter-RAT measurement requirement

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

**R4-2216483 Discussion on RRM requirements for inter-RAT measurement without gap**

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

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

**R4-2216739 Discussion on inter-rat measurements**

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

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

6.10.4 Moderator summary and conclusions

**[104-bis-e][216] NR\_MG\_enh2\_part1, AI 6.10 and 6.10.2 – Ato Yu**

**R4-2216927 Email discussion summary for [104-bis-e][216] NR\_MG\_enh2\_part1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-14**

**Issue 2-2: Definitions: legacy, concurrent, baseline and component gaps**

* Proposals
  + Proposal 1: Xiaomi, Huawei, Ericsson
    - Legacy MG: Gap(s) configured via GapConfig without suffix
  + Proposal 2a: Huawei
    - Con-MG: Gap(s) configured via GapConfig-r17 without preConfigInd-r17 or ncsgInd-r17
  + Proposal 2b: Ericsson
    - Con-MG: Gap(s) configured by gapConfig-r17
  + Proposal 3: Ericsson
    - ~~Baseline~~ NMG: Gaps including legacy gap and Con-MG
  + Proposal 4: vivo
    - Component gap: one particular configured gap pattern within a concurrent gap
* Recommended WF
  + Agree on Proposal 1 which was the consensus during RP#97 discussions.
  + Collect views about proposals. Note that some proposals are not mutually exclusive.

**Discussion:**

Moderator: the definitions are used for the discussions only.

Qualcomm: we agree with the clarification from moderator. On legacy MG, the proposal seems ok for this discussion. But the definition of ‘legacy’ will change and let’s keep this in mind. P1,2 and 4 seem useful.

Apple: we are fine to the agreement. Similar view on legacy gap with QC. Let’s add additional info together with the agreement. Let’s also check on P3 for baseline MG.

OPPO: we are fine with the agreements in general. On con-MG, is it a new term? Do we need to redefine the existing definition of ‘concurrent gap’?

CMCC: we support P1. On P2 we don’t think we need it. It seems conflicted with updated WID. Case 1 is reconfigured gap and concurrent gap. But P2a excludes combo between pre-gap and NCSG.

Vivo: on P4, the intention is to provide the tool to differentiate concurrent gap and component gap. We are ok with the agreements.

Ericsson: on Con-MG, it is for discussion. It is not captured in the spec. it has no impact on the scope of the WI. It does not exclude any item described in the WID. In MUSIM gaps we need to have different terms but we prefer to align the terms between WI-s.

Intel: let’s not mix gap and gap patterns. Apple intention is to categorize gaps based on gap patterns. We are not sure about that. Maybe we need to clarify what is it that we really want to categorize.

ZTE: We agree with the WF. In R18 the concepts are helpful if they are clear. Component gap can be anyone among the 4 categories. Anyone can be discussed in R18. On P4, we support it.

Huawei: we agree to moderator that this is for discussion only. Can we consider to update the wording.

Nokia: we agree with the agreement. We don’t support P3 or P4.

Qualcomm: Huawei suggestion is good. Release number is clearer. This agreement is only about term instead of any scenario. We disagree that measurement gap patterns are included since those patterns are also applied to other types of gaps outside R15 normal gap.

Apple: we agree with Huawei new proposal. The wording is for NCSG exclusion. On P4, ‘within a concurrent gap’ is vague.

Vivo: Huawei suggestion is good. One minor update R15 to R16. R16 has priority.

Ericsson: two small updates.

**Tentative Agreement:**

* + Definitions:
    - ~~Legacy R15/R16 normal NMG R16~~ T1MG: Gap(s) configured via GapConfig without suffix
      * ~~Measurement gap patterns defined in table 9.1.2-1.~~
    - ~~Con- R17 normal NMG R17~~ T2MG: Gap(s) configured via GapConfig-r17 without preConfigInd-r17 or ncsgInd-r17
      * This is different from the existing ‘concurrent measurement gap’

**Issue 2-3: [Case 1] Whether to consider Pre-MG + Pre-MG in an FR**

* Moderator’s understanding:
  + There is no restriction in WID, but RAN4 can still have WG-level discussions on whether to work on it.
  + Let’s focus on the high-level principle in the 1st round. If consensus is achieved, we can discuss the detail gap combinations in the 2nd round.
  + Some companies provided more extended cases which include per-UE and per-FR cases. Moderator suggests discussing this step-by-step. So, let’s focus on one FR first.
* Proposals
  + Option 1: Intel, Apple, CMCC, OPPO, [vivo], ZTE, MTK
    - Yes
  + Option 2: Ericsson
    - Deprioritize this combination
  + Option 3a: OPPO
    - Up to UE capability
  + Option 3b: Qualcomm
    - It would be subject to a new UE capability if the Pre-MGs collide with each other or with other MGs

**Discussion:**

**Agreement:**

**Issue 2-15: [Case 2] Whether to consider NCSG + NCSG in an FR**

* Moderator’s understanding:
  + There is no restriction in WID, but RAN4 can still have WG-level discussions on whether to work on it.
  + Let’s focus on the high-level principle in the 1st round. If consensus is achieved, we can discuss the detail gap combinations in the 2nd round.
  + Some companies provided more extended cases which include per-UE and per-FR cases. Moderator suggests discussing this step-by-step. So, let’s focus on one FR first.
* Proposals
  + Option 1: Intel, Apple, CMCC, [vivo], ZTE
    - Yes
  + Option 2: Ericsson
    - Deprioritize this combination
  + Option 3: Qualcomm, OPPO
    - Up to UE’s capability

**Discussion:**

**Agreement:**

**[104-bis-e][217] NR\_MG\_enh2\_part2, AI 6.10.3 – Rui Huang**

**R4-2216928 Email discussion summary for [104-bis-e][217] NR\_MG\_enh2\_part2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-14**

**Issue 1-1-1: Whether interruption is expected in R18 when UE reports ’no-gap’ in ‘NeedForGapsInfoNR'**

* Proposals
  + Option 1: Intel, Apple, Xiaomi, Ericsson, ~~Nokia,~~ MTK, Qualcomm, ZTE
    - Yes
  + Option 2: CATT, CMCC, Huawei~~, ZTE~~ Nokia
    - No
  + Option 3: Intel, Xiaomi, Apple, OPPO, vivo, Qualcomm
    - Introduce additional UE capability to differentiate whether UE needs interruption
  + Option 4: Nokia, Huawei, Ericsson
    - If interruption is needed for a UE without gaps, it should be indicated using new indication as part of needForGaps, ~~needForGapsNCSG~~ or a new information element.

**Discussion:**

Apple: we support Option 3. RAN4 did good work on NCSG in R17. Things have not changed much from the UE side. We prefer Option3.

CMCC: we support Option 2. In LTE spec, no gap means no gap no interruption. Why is it different in NR? If we allow interruption, when and where is that? It is different from NCSG.

Nokia: our main concern is not to change the interpretation of no gap. Option 3 confuses since needforgap is not a UE capability but a UE assistance info. If the UE needs to indicate it does not need gap new IE needs to be introduced.

MediaTek: we support option 1. We are also OK with option 3. On O4, is it the same with O3 but different term. On CMCC comment, we are not following LTE on everything. It is fine to introduce something different for NR.

CATT: we also support O2. To MTK, we are not going to follow everything but no interruption is already the case in LTE and NR should do better in perf. On O3 and 4, they are the same but O4 is updating existing IE.

ZTE: the discussion resembles NCSG ones. The situation is very similar.

Qualcomm: current requirements are not clear when UE report ‘no gap’. We support Option 1. It is different way from NCSG in this scope in terms of BWP switching. We prefer new signalling.

Huawei: we support option 2. We can compromise. Option 4 now is our first preference. Perhaps we need to remove something.

Ericsson: we are fine with O4 with update from Huawei.

Intel: the reason we allow interruption is clear that in R18 if the UE report needforgap ‘no gap’, the UE utilizes the vacant chain. New indication can be introduced to resolve the compatibility issues. Option3 should not be precluded.

Moderator: let’s double check on P3 and P4 whether the essence are the same.

**Issue 2-1-3: inter-RAT NR target scenarios**

* Proposals
  + Option 1: Xiaomi, CMCC
    - **Case a-1**: Another spare RF chain is available for UE and
    - **Case a-2**: The target RS to be measured is with UE’s active RF chain

Moderator notes: whether both of scenarios can be indicated by the same or different capability can be FFS in issue 2-2-2 and 2-2-3.

**Discussion:**

**Agreement:**

**Issue 2-1-4: inter-RAT LTE target scenario**

* Proposals
  + Option 1: CMCC, Xiaomi
    - **Case b-1**: when LTE CRS to be measured is not completely contained in UE’s active BWP, but there is spare RF chain and
    - **Case b-2**: when LTE CRS to be measured is contained in UE’s active BWP
  + Option 1a: vivo
    - **Case b-2**: when LTE CRS to be measured is contained in UE’s active BWP
    - FFS on case b-1:when LTE CRS to be measured is not completely contained in UE’s active BWP, but there is spare RF chain
  + Option 2: Intel, Apple, CATT,OPPO, Ericsson, Huawei, Qualcomm
    - **Case b-2 ONLY**: Only when LTE CRS to be measured is contained in UE’s active BWP
      * For the inter-RAT LTE gap-less measurement when UE has the vancant RF chain, the corresponding requirements was defined in Rel17. Thus no need to consider this scenario in Rel18 scope.

**Discussion:**

**Agreement:**

6.12 Enhanced NR support for high speed train scenario in frequency range 2

6.12.4 Study on reference tunnel deployment scenario and UL timing adjustment solution

**GTW on Oct-13**

**Tunnel deployment and UL timing**

**R4-2215552 On Tunnel Deployment and UL Timing Adjustment in HST FR2 Enhanced**

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

**Abstract:**

An initial paper on HST FR2 Enhanced Rel-18 that considers paramters, channel model, mobility in Tunnel deployments and discusses some of the UL timing aspects.

**On tunnel deployment:**

* In tunnel scenario, DUE\_height can be kept unchanged. DRRH\_height and Dmin is limited by tunnel’s shape and dimensions (i.e., width and height), and Ds is dependent of the route shape (i.e., curved or straight), length of the tunnel.

1. Common reference model for tunnel scenario should be general but relevant for different shape and dimensions of real tunnels. Similar to open-space considerations, the straight tunnel scenario could be considered as the starting point.

**For a common reference tunnel modelling in HST FR2 deployment parameters Dmin = 0 m, DRRH\_height = 8 m, Ds = 700 m can be used.**

1. LoS propagation assumption is valid in the tunnel deployment. However, different to open space conditions, the multipath effect may show stronger impact on the characteristic of the tunnel channel due to waveguiding effect with more reflection and scattering. Therefore, single-tap LoS propagation conditions assumed in Rel-17 HST FR2 may not be accurate enough.

**RAN 4 to consider LoS UMi street canyon channel mode for the RRM evaluations of HST FR2 tunnel deployment.**

**RAN4 to consider using multi-path fading channel model with strong LoS component for the performance evaluation of HST FR2 tunnel deployment.**

1. Mobility is much more challenging in tunnel deployment. One of the reasons is the fast decay of received signal strength at the edge of the RRH beam coverage when the train is travelling in the direction opposite to the serving beam orientation. This effect can be observed with HO-based and L1-based mobility, both in uni-directional and bi-directional tunnel deployments.

**RAN4 to discuss the mobility issue when the train is travelling in the direction opposite to the serving beam orientation, especially, in the case when RRH are close to the track, i.e., in tunnel deployments.**

**On UL timing adjustment:**

1. From the continued Rel-17 discussion related to inter-RRH switch and one-shot UL timing adjustment it is clear that the current solution may work although UE performance is unclear.
2. Network assistance signalling for inter-RRH indication was analysed in Rel-17 HST FR2, but further discussions were precluded at RAN4#102-e.

**RAN4 to focus, firstly, on the discussion of NW assistance signaling that could help to distinguish intra-RRH and inter-RRH TCI state switch.**

**RAN4 to consider an extension of TCI state switch command with a flag indicating inter-/intra-RRH switch.**

1. There are ongoing Rel-18 MIMO discussions in RAN1 about the two TA enhancement for the UE and about association of TAGs to UL channel/signals. The outcomes might be usable in the HST FR2 context.

**RAN4 to discuss whether HST FR2 two-RX-chain UE can support two TA enhancement.**

**RAN4 to discuss a potential impacts of large jump in propagation delay on UE MAC and *timeAlignemntTimer* in the case of inter-RRH TCI state switch.**

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

**Discussion:**

Qualcomm: regarding tunnel deployment, what are the paths that are resolvable needs consideration. In order to decide whether you really have a multipath scenario you need to specify the width of the tunnel as the assumption in our evaluation. The parameter needs to be specified to tell that we are in a multipath scenario. We can assume that we only have 1 reflection in the tunnel. For UL timing, it is not obvious what change is needed there. Regarding switching, mac ce based TCI state switch makes sense.

Samsung: regarding tunnel deployment, comments are there and in the end, we can discuss detailed parameters and the dimension of the tunnel is also considered. We like to highlight: what we can expect from this whole discussion are two aspects. One is channel model: number of reflections, multipath, etc. the other is that we have to provide guidance and reference to the deployment itself, say how long the separation can be allowed, etc. regarding UL timing, in general we had already basics. We could start from that basis for both RRC and MACCE solutions.

Apple: on tunnel deployment, we are open to further discussion. We need further analysis to decide on the parameters. Regarding UL timing, we can start from we had in R17. On P7, in this item, UE is expected to be implemented 2Rx but it is different with implemented with 2TA capability. On P8, we are not sure on what we need to do in RAN4.

Ericsson: on tunnel deployment, we have similar concern as Qualcomm. LOS or nLOS is not resolvable easily. About UL timing, we believe we had agreements in R17 for single panel. In this item we need to consider multipanel in the discussion. Enhancements are possible regarding this aspect.

Huawei: a quick question on P8, what’s the subsequent UE /NW behaviours.

Nokia: regarding tunnel scenario, tunnel assumption is indeed missing. Regarding timing, P7: it is related to multipanel impact and it is evaluated in this item. UL transmission from multipanle is out of the scope of this item. On P8, if the timing alignment is lost it could cause the reset of the timer. It might be RAN2 to decide the machenism. When the jump happens it was not taken into account.

**R4-2216711 Study on reference tunnel deployment scenario and UL timing adjustment solution**

*Type: discussion For: Discussion  
 Source: Samsung*

**Abstract:**

In this contribution, we provided our viewpoints on the RF requirements for reference tunnel deployment and UL timing adjustment solution for FR2 HST enhancement for this work item, accordingly the following observations and proposals are obtained:

**Proposal 1: RAN4 discuss and study the key parameters for tunnel deployment by considering feasibility study of tunnel scenarios:**

**- Ds: the distance separation between two neighboring RRH sites.**

**- DRRH\_height: determined/limited by tunnel height and RRH deployment method**

**- Tunnel dimensions: such as tunnel shape, height, width etc.**

**- gNB RRH Antenna Element Assumption.**

**Proposal 2: For the feasibility study of tunnel scenarios, the assumed parameters for train-roof-mounted CPE UE in Rel-17 WI can be reused.**

**Proposal 3: Based on the study on tunnel scenario, at least the following targets can be expected:**

**- FR2 HST Tunnel scenario channel model;**

**- Typical FR2 HST deployment scenario for tunnel scenario.**

**Observation 1: As an optional feature specifically for FR2 PC6 UE, the RRM requirement for the expected procedure and accuracy of the one shot large UL timing adjustment is introduced in clause 7.1.2.3 in TS38.133.**

**Proposal 4: RAN4 continue to discuss UL timing adjustment solution, including explicit NW signalling assistance in Rel-18, based upon Option 3 and 4 captured in WF R4-2120416.**

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

**Discussion:**

**R4-2215700 R18 FR2 HST enhancement core requirement scope**

*Type: discussion For: Discussion  
 Source: Qualcomm Israel Ltd.*

**Abstract:**

**Observation 1: In R17 we already have Dmin = 10m study which leads to 2Rx beam based requirement. Further reducing to 1Rx is unlikely due to two directions coverage.**

**Observation 2: We don't have multi-path requirement specified for tunnel scenario in FR1 HST which is more likely to have more reflection paths than FR2, and therefore single path or leakage cable channel model apply to FR2 tunnel scenarios.**

**Proposal 1: Do not introduce new requirements for tunnel scenarios.**

**Observation 3: The RSRP measurement accuracy is off by 0.6dB with 2CP timing offset. Detection large timing change by SSB timing for measurement purpose is not reliable.**

**Observation 4: Without timing accuracy requirement on SSB measurement, network or UE can not determine a proper threshold for large timing jump detection.**

**Proposal 2: Add a MAC-CE command to inform UE of the TCI state switch is across RRH and send an LS to RAN2.**

**Proposal 3: Network can indicate different SSBs on adjacent RRHs having the same QCL property: signal the mapping between the repeated sets of beams from the adjacent RRHs.**

**Proposal 4: RAN4 to study the relevant assumptions and deployment scenarios for multi-panel simultaneous reception in FR2, e.g.,**

* **Type of deployment: bi-directional seems to be appropriate. Does RAN4 need to study uni-directional deployment?**
* **Whether the signal from the opposite direction RRH is negligible during simultaneous reception of data.**

**Proposal 5: For activated Scell, intra-frequency measurement enhancements in FR2 HST applies. For deactivated Scell measurement, the following requirements apply:**

|  |  |
| --- | --- |
| DRX cycle | TPSS/SSS\_sync\_intra |
| No DRX | Ceil(M1Note 2 x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 80ms | Ceil(M1Note 2x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| 80ms< DRX cycle≤ 320ms | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(Mpss/sss\_sync\_w/o\_gaps x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: The requirements also apply to deactivated SCG SCell.  NOTE 2: For UE supporting power class 6, M1= 6 if [highSpeedMeasFlagFR2-r17 = set1] or M1= 18 if [highSpeedMeasFlagFR2-r17 = set2] | |
| DRX cycle | T SSB\_measurement\_period\_intra |
| No DRX | Ceil(M1Note 2 x Kp) x measCycleSCell x CSSFintra |
| DRX cycle≤ 80ms | Ceil(M1Note 2x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| 80ms< DRX cycle≤ 320ms | Ceil(Mmeas\_period\_w/o\_gaps x Kp) x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra |
| DRX cycle> 320ms | Ceil(Mmeas\_period\_w/o\_gaps x Kp) x max(measCycleSCell, DRX cycle) x CSSFintra |
| NOTE 1: The requirements also apply to deactivated SCG SCell.  NOTE 2: For UE supporting power class 6, M1= 6 if [highSpeedMeasFlagFR2-r17 = set1] or M1= 18 if [highSpeedMeasFlagFR2-r17 = set2] | |

**Note that the enhanced requirements only apply to SMTC <= 40ms.**

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

**Discussion:**

**R4-2216009 Discussion on reference tunnel deployment scenario**

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

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

**R4-2216403 Tunnel scenario for FR2 HST**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on tunnel

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

6.12.5 Identification of RRM core requirements

**GTW on Oct-13**

**RRM core requirements**

**R4-2215553 On RRM Core Requirements in HST FR2 Enhanced**

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

**Abstract:**

Main focus of this paper is on CA and Multi-Rx aspects. Additionally, a general table with expected RRM impacts is provided.

|  |  |  |  |
| --- | --- | --- | --- |
| RRM Req. Category (TS 38.133) | Sub-Category | Rel-17 HST FR1\_enh and FR2 Standardization Impact (for reference)\* | Rel-18 HST FR2-enh Standardization Impact\* |
| 4, 5 Idle/inactive state mobility | Cell selection/re-selection, measurement | Enhance |  |
| 6. Connected state mobility | 6.1 Handover | No impact |  |
| 6.2.1 Connection Mobility Control -  RRC re-establishment | Enhance |  |
| 6.2.2 Connection Mobility Control -  Random Access | No impact | No impact expected |
| 6.2.3 Connection Mobility Control - RRC Release with Redirection | Not applicable | No impact expected |
| 7. Timing | 7.1 UE transmit timing | Enhance |  |
| 7.2 UE timer accuracy, 7.3 Timing advance, 7.4 Cell Phase Sync accuracy, 7.7 deriveSSB-IndexFromCell tolerance | No impact |  |
| 7.5 MRTD, 7.6 MTTD | No impact |  |
| 8. Signalling | 8.1 RLM | Enhance |  |
| 8.2 Interruption | No impact |  |
| 8.3 SCell Activation and Deactivation Delay | No impact |  |
| 8.4 UE UL carrier RRC reconfiguration delay | Not applicable | No impact expected |
| 8.5 Link Recovery procedures | Enhance |  |
| 8.6 Active BWP switch delay | No impact | No impact expected |
| 8.9 PSCell Addition and Release Delay | Not applicable | Not applicable |
| 8.10 Active TCI state switching delay | Enhance |  |
| 8.11 PSCell Change | Not applicable | Not applicable |
| 8.12 Uplink spatial relation switch delay | No impact |  |
| 8.13 UE-specific CBW change | No impact | Not applicable |
| 8.14 Pathloss reference signal switching delay | No impact | No impact expected |
| 8.15 Active downlink TCI state switching delay for unified TCI | No impact (not discussed) |  |
| 8.16 Active uplink TCI state switching delay for unified TCI | No impact (not discussed) |  |
| 8.17 SCG Activation and Deactivation Delay | No impact (not discussed) | Not applicable |
| 8.18 TRP specific Link Recovery Procedures | No impact (not discussed) |  |
| 8.19 Pre-configured measurement gap activation/deactivation delay | No impact (not discussed) |  |
| 9. Measurement Procedure | 9.1 General measurement requirement | No impact |  |
| 9.2 NR intra-frequency measurements | Enhance |  |
| 9.3 NR inter-frequency measurements | Enhance |  |
| 9.4 Inter-RAT measurement | Not applicable | Not applicable |
| 9.5 L1-RSRP/9.8 L1-SINR Measurement | Enhance |  |
| 9.6 NE-DC: Measurements | Not applicable | Not applicable |
| 9.7 Cross Link Interference measurements | No impact (not discussed) | No impact expected |
| 9.9 NR measurements for positioning | No impact (not discussed) | No impact expected |
| 9.10 CSI-RS based L3 measurements | No impact | No impact expected |
| 9.11 NR measurements with autonomous gaps | Not applicable | Not applicable |
| 9.12 Measurement for Propagation Delay Compensation | No impact (not discussed) | Not applicable |
| 9.13 L1-RSRP measurements for a cell with different PCI from serving cell | No impact (not discussed) |  |
| \* Requirements’ classification categories:   * Not applicable: the requirement is not applicable to FR2 HST UEs * No impact: no change on Rel-15/16/17 requirement is needed, and the same requirement applies to FR2 HST UEs. * Enhance: The requirement need or was enhanced.   FFS: need to discuss whether the requirement need to be enhanced. | | | |

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

**Discussion:**

Samsung: regarding multipanle, we share the same view as Nokia. On P2 and P3 we agree. From the WID we are allowed to discuss multipanel topics in the HST scenario. We support P2 and P3 but on whether to allow multipanel operation between measuremtn and data scheduling we don’t same discussion happens on both items of HST and multiRX. Regarding JT, DPS JT should be prioritized as in R17 but for others we think SFN can be excluded and further discuss others. On scenario discussion, we focused on the requirements instead of the scenarios in R17. We don’t see clear answers to decide which scenario is definitely feasible. For UL transmission, we agree with that multi UL Tx is out of scope. We do not need UL TCI state concept in the HST. Regarding the table for RRM impact, we agree with the items which are out of the scope.

Qualcomm: SCell is not deactivated. Reducing Rx scaling factor is possible since both Rx are needed. Regarding JT, SFN is excluded but we are not sure about it currently. A comment on the RRC based UL timing, inter RRH – SSB correspondence can be realized by MAC message with 1bit using SSB indexes. It helps a lot in performance of both mobility and demod.

Ericsson: the architecture mentioned in the paper is good about the reference of multipanel. We need to identify the differences between multipanel multiRx terms.

ZTE: we agree with P2 and P4. The two Rx chains assumption is correct. In R18 multiRx item, 2 chains are assumed. Here it is the same. Clarification on focusing on simutaenous reception or considering everything including L1 is needed.

Apple: regarding the table a question: differences among ‘no impact’’no impact expected’ and blank. We avoid the overlap discussions between this item and multiRX item. We prefer to reuse or follow the discussion in multiRX in this item. Regarding RRC based UL timing, MAC based solution is more attractive to us.

Nokia: regarding UL TCI state switch, there are new cases in R18. We need to check according to that. The contents in the table is still initial thought. Let’s start from the items whicha re not applicable in the WI.

**R4-2216311 Discussion on FR2 eHST impact on RRM**

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

**Abstract:**

This contribution provides the consideration on R18 enhanced NR support for high speed train scenario in FR2. The following proposals are provided:

**Proposal 1: To further study whether PSS/SSS detection requirements on SCC need to be specified in intra-band CA FR2 HST scenario.**

**Proposal 2: The measurement period for intra-frequency measurement without and with gap specified in R17 FR2 HST can be reused to the measurement period for activated SCell in R18 FR2 HST at least for open deployment scenarios.**

**Proposal 3: The RX beam scaling factor under tunnel scenario needs further study.**

**Proposal 4: Further study whether SCell is deactivated in FR2 HST scenario.**

**Proposal 5: The time period of time index on SCell may not need to be specified in intra-band CA FR2 scenario.**

**Proposal 6: Whether RAN4 needs to specify SCell activation/deactivation delay in R18 FR2 eHST depends on whether SCell is deactivated in FR2 scenario.**

**Proposal 7: In R18, simultaneous multi-panel operation is not supposed to be applied for L3 RRM measurements.**

**Proposal 8: In R18, the sharing factor between L1 and L3 measurements needs to be kept in L3 RRM measurement requirements.**

**Proposal 9: If RRHs are used as different TRPs for a serving cell, UE can be assumed to support simultaneous L1 measurements on two different QCL-typeD RSs from different RRHs of the serving cell, and the precondition is that two RSs are simultaneously received on two different antenna panels.**

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

**Discussion:**

**R4-2215460 Discussion on RRM requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215712 Discussion on FR2 HST RRM enhancement for CA scenario**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215824 Discussion on RRM requirements for FR2 HST**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2216506 Requirements for CA in HST FR2**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussions on RRM requirements for HST FR2 Rel18

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

**R4-2216712 Analysis on RRM core requirement impact for FR2 HST enhancement**

*Type: discussion For: Discussion  
 Source: Samsung*

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

6.12.6 Moderator summary and conclusions

**[104-bis-e][218] NR\_HST\_FR2\_enh\_RRM, AI 6.12.4 and 6.12.5 – Jackson He Wang**

**R4-2216929 Email discussion summary for [104-bis-e][218] NR\_HST\_FR2\_enh\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

6.13 Air-to-ground network for NR

6.13.5 RRM core requirements

**R4-2215396 Further discussion on Rel-18 ATG RRM**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215505 Discussion on RRM requirements for ATG**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215635 Further discussion on RRM requirement for ATG**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215937 Discussion on RRM core requirements for ATG UE**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

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

**R4-2216276 Discussion on RRM requirements for ATG**

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

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

**R4-2216481 Discussion on RRM requirements for air-to-ground network**

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

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

**R4-2216769 Discussions on A2G RRM requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

During RAN4#104-e, RAN4 had initial discussions to identify the RRM impact of introducing requirements for ATG. Some high-level agreements related to scenario, specification impact, assistance information were reached. In addition, technical proposals rel

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

6.13.6 Moderator summary and conclusions

**[104-bis-e][219] NR\_ATG\_RRM, AI 6.13.5 – Shiyuan Wang**

**R4-2216930 Email discussion summary for [104-bis-e][219] NR\_ATG\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-14**

**Issue 1-1: ISD assumption**

* Proposals
  + Option 1: First study ATG RRM requirements with ISD assumption of 100-200km. If RF session come to other conclusions beyond the assumption range, then come back to have more study on ISD related requirements. (CMCC)
  + Option 2: The maximum range in ATG to be considered can be evaluated in Demod session with respective to the PRACH demodulation performance. (HW)
* *Tentative agreements:*
* Start the discussion with ISD assumption of 14-200 km. If the assumption is not valid based on the conclusion from RF/Demod session, we can revisit the RRM requirements which would be impacted.

**Discussion:**

Huawei: what is the RRM impact from this assumption. Is MRTD affected?

CATT: we can compromise to Option 1. RRM requirements are considered from 2 aspects, 100km – 200km ISD and up to 600km ISD at the end of the day.

CMCC: option 1 is the common part between discussions in RF and RRM. It is better for us to choos the common part first as baseline. To Huawei, ISD has impact on many RRM requirements including mobility, measurements, timing requirements. 300km is not excluded.

Ericsson: we are fine with the tentative agreements. To Huawei, if ISD is larger than 200km, normal RA will not work according to the existing RA design.

Qualcomm: we are fine with the WF. If 300km is considered, are we going to come back and revisit all the requirements? Let’s include 300km in the evaluation to see if there is huge gap.

ZTE: we support option 1. We are open to further discuss option 2. ISD decides propagation delay and affects timing requirements.

LGE: we support option 1. 300km depends on RF conclusion.

Ericsson: in the WID, extreme coverage range is considered as cell range of 300km. It is 600km ISD.

CMCC: FYI, current RF discussion does not consider 300km or 600km ISD at the moment.

**Agreement:**

* First study ATG RRM requirements with ISD assumption of 100-200km. If RF session comes to other conclusions beyond the assumption range, RRM can come back for more study on ISD related requirements.

**Issue 3-1-1: The mechanism of *Koffset* and *Kmac***

* Proposals
  + Option 1: The Kmac should not be needed in ATG network, and the Koffset should be used to support up to 300km cell coverage range. (CATT)
  + Option 2: Introduce the mechanism of Koffset in ATG system. The conclusion can be revisited after RF session draw the final conclusion about ISD and so on. (CMCC)
  + Option 3: Referring to whether need to introduce Koffset and Kmac identified in NTN into ATG system, for Kmac, not necessary since of no feeder link existence; for Koffset, considering the RTT for cell edge UE under extreme case, we are open to discuss the necessity. (ZTE)
* Recommended WF
  + No need to consider Kmac in ATG network, FFS the Koffset based on cell coverage range.

**Discussion:**

**Agreement:**

**Issue 3-1-2: Frequency offset tracking**

* Proposals
  + Option 1: The solution of frequency offset tracking in NTN system can be considered as reference for ATG system when SSB+TRS is not sufficient for some combination of frequency and SCS. (ZTE)

**Discussion:**

**Agreement:**

**Issue 3-3-1-1: Initial transmit timing requirements Te**

* Proposals
  + Option 1: The initial transmit timing requirement Te need to be defined for ATG UE, and the requirements for NTN UE can be used as baseline. (CATT)
  + Option 2: Reuse the legacy R15 TN requirement for initial transmit timing requirement Te with the assumption of ISD 100-200km. The issue should be reviewed after receiving the conclusion about ISD and cell radius from RF session. (CMCC)

**Discussion:**

**Agreement:**

6.18 Study on expanded and improved NR positioning

6.18.4 RRM aspects in the study on expanded and improved NR positioning

**PRS/SRS bandwidth aggregation**

**R4-2215885 RRM aspects of expanded and improved NR positioning**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper we presented our view on RRM aspects of expanded and improved NR positioning. The discussions presented in chapter 2 are summarized in the following observations and proposals:

**Proposal 1**: PRS resources sharing the same numerology across carriers/PFLs can only be aggregated for MC positioning measurements.

**Proposal 2**: PRS resources in different carriers/PFLs from the same TRP or co-located TRPs can only be aggregated for MC positioning measurements.

**Proposal 3**: PRS resources to be aggregated for MC positioning measurements from different PFLs/carriers can have different bandwidths.

**Observation 1**: Number of carriers/frequency layers configured to UE for CA/DC communication can be changed dynamically/semi-statically. Number of activated SCells may also be changed over time

**Proposal 4**: Depending on the MCPC capability of UE capability, the LMF will configure the UE with two or more carriers/PFLs for MC positioning measurements.

**Proposal 5**: The number of carriers/PFLs with which UE is configured for MC positioning measurement has an impact on MC positioning measurement period.

**Observation 2**: The UE may typically fully or partially reuse its RF resources for MC communication for performing MC positioning measurements.

**Observation 3**: The LMF which configures UE for performing MC positioning measurements may not be aware of the ongoing CA/DC operation for communication.

**Proposal 6**: Evaluate MCPC and its impact on RRM when MC positioning measurement is done within MG.

**Proposal 7**: Evaluate MCPC and its impact on RRM when MC positioning measurement is done outside of the MG.

**Observation 4**: Aspects related to reference signal to be used and physical layer procedures for carrier phase measurement are yet to be settled in RAN1.

**Observation 5**: Re-using Rel. 17 NR PRS would imply reusing Rel. 17 NR positioning physical layer procedure for carrier phase measurement-based positioning with no significant impact on RRM.

**Observation 6**: If a new dedicated reference signal is defined for carrier phase measurement, this would imply a new physical layer procedure and might have an impact on RRM.

**Observation 7**: It is not clear whether carrier phase measurement-based technique is going to be defined as a standalone positioning method or is going to be implemented complementary to Rel. 17 positioning methods.

**Proposal 8**: RAN4 to wait for RAN1 conclusions on reference signal and physical layer procedure related to carrier phase measurement before evaluating impact on RRM.

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

**Discussion:**

**Carrier phase measurements**

**R4-2216229 RRM impacts for NR positioning accuracy improvements bandwidth aggregation and carrier phase measurements**

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

**Abstract:**

RRM impacts for both Rel-18 NR accuracy improvements, namely PRS/SRS bandwidth aggregation and carrier phase measurements, are discussed on high level in this contribution.

The following proposals are made.

**For the RRM impacts study, prioritize intra-band contiguous CA with simultaneous PRS or SRS symbols transmitted for the different carriers in the same slot.**

**CA configurations with 2, 3 and 4 CCs should be investigated and the configuration with 2 CCs should be prioritized over 3 and 4 CCs.**

**PRS/SRS bandwidth aggregation should also be investigated for RRC\_INACTIVE.**

**RAN4 to study RRM impacts for PRS/SRS bandwidth aggregation on measurement period requirements, measurement reporting requirements, measurement accuracy requirements as well as additional margins for covering impairments following preferred scenarios, i.e. intra-band contiguous with simultaneous PRS/SRS transmission, preferred number of CC’s, support in connected and inactive RRC states.**

**For the RRM impacts study, prioritize single carrier PRS/SRS transmission.**

**Carrier phase measurements should also be investigated for RRC\_INACTIVE.**

**RAN4 to study RRM impacts, based on existing and further RAN1 agreements, for carrier phase measurements on measurement period requirements, measurement reporting requirements, measurement accuracy requirements as well as additional margins for covering impairments following preferred scenarios, i.e. single carrier PRS or SRS transmission, support in connected and inactive RRC states.**

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

**Discussion:**

**R4-2215432 Discussion on RRM aspects in the study on expanded and improved NR positioning**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215825 RRM requirements on expanded and improved NR positioning**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

6.18.5 Moderator summary and conclusions

**[104-bis-e][220] FS\_NR\_pos\_enh2\_RRM, AI 6.18.4 – Muhammad Kazmi**

**R4-2216931 Email discussion summary for [104-bis-e][220] FS\_NR\_pos\_enh2\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-13**

**Topic #1 PRS/SRS Bandwidth Aggregation**

**Issue 1-6-1: RRM issues for PRS/SRS bandwidth aggregation**

* Proposals
  + Proposal 1: Nokia
    - RAN4 to study RRM impacts for PRS/SRS bandwidth aggregation on measurement period requirements, measurement reporting requirements, measurement accuracy requirements as well as additional margins for covering impairments following preferred scenarios, i.e. intra-band contiguous with simultaneous PRS/SRS transmission, preferred number of CC’s, support in connected and inactive RRC states.
  + Proposal 2: E///
    - Proposal 1A:
      * Evaluate MCPC and its impact on RRM when MC positioning measurement is done within MG.
    - Proposal 1 B:
      * Evaluate MCPC and its impact on RRM when MC positioning measurement is done outside of the MG.

**Discussion:**

Moderator: R4-2215885 can be presented quickly for this issue.

Intel: we share the same view as moderator that we could still discuss the details in the WI stage. A question on P1 in 5885, whether to exclude the aggregation between layers with different numerologies is questionable. If so, the scenario is limited. what is the harm to include mix numerology?

Huawei: in general we also agree about the staging. Regarding Proposal 1 from Nokia we can have the discussion in the WI stage. On P1 in 5885, we are one of the supporters. Based on RF conclusion we are prioritizing single chain architecture which is for intra-band Contiguous CA. allowing the mix numerology cases increases UE complexity a lot. For Proposal 2 above, both measurement outside and inside MG are considered for BW aggregation.

Nokia: we agree to the proposals above. On different BW, we should discuss it prior to the WI stage. Regarding the MG, it is important to be discussed. On the requirements mentioned is about the impact on the requiremetsn and it should be discussed now. If we have certain kind of UE capability to indicated the number of UE supports to measurement carriers.

CATT: we also agree to discuss UE capability and requirements impact aspects in the WI stage. When we study the impact in the WI stage, we will together discuss the capability. We should focus on P1 2 3 in 5885. We support P1. We focus the signle numerology in the study stage but to be open in the WI stage. We agree with Huawei on including both measurement with and without MG.

Apple: the details are discussed in the WI stage. We agree with Huawei for BW aggregation, we assume signle numerology is prioritized. We can study the feasibility on the measuremtn with or without gap. The detailed impact is discussed in the WI stage.

Qualcomm: regarding Nokia proposal above, we think at this stage we should focus mainly on issues for feasiblitiy. It is hard to see the final impact since most of these depend on the capability discussion which happens in the WI stage. We cannot get to the details currently. On P1 in 5885, the asuumption of single numerology is reasonable. It is the typical case.

Ericsson: on P1 in 5885, a generic idea is to focus on the feasibility study in the SI stage.

**Topic #2 carrier phase measurements**

**Issue 2-1-1: When to initiate RAN4 study carrier phase measurements?**

* Proposals
  + Proposal 1: CATT, OPPO, Ericsson
    - RAN4 wait for conclusive RAN1 outcome on carrier phase measurements before starting RAN4 study:
    - Proposal 1A: CATT
      * Wait for RAN1 conclusion or RAN1 LS to start RAN4 work on accuracy improvement study based on carrier phase measurements.
    - Proposal 1B: OPPO
      * Not start the work on carrier phase measurement in RAN4 before progressive conclusions reached in RAN1.
    - Proposal 1C: Ericsson
      * RAN4 to wait for RAN1 conclusions on reference signal and physical layer procedure related to carrier phase measurement before evaluating impact on RRM.

**Discussion:**

Moderator: R4-2216229 can be presented quickly for this issue.

Session Chair: we don’t expect RAN4 conclusion in this meeting.

Nokia: we think that RAN4 can progress regarding evaluation method and framework. It is important to discuss on what and how our evalution is generated. We think the assumptions should be aligned between BW aggregation and carrier phase measurement.

CATT: just on this topic, it is different from BW aggregation where BW is led by RAN4.

Ericsson: we echo with CATT comments. We need to wait for RAN1 conclusion and design. We should avoid to do parallel work.

6.19 Multi-carrier enhancements for NR

6.19.3 RRM core requirements for multi-carrier enhancements

**GTW on Oct-13**

**R4-2215798 DL interruption and UL outage time for Rel-18 Tx switching**

*Type: discussion For: Discussion  
 Source: China Telecom*

**Abstract:**

In this contribution, we had the following proposals on DL interruption for Tx switching across 3/4 bands with single TAG:

***Proposal 1:*** *For Rel-18 Tx switching across 3/4 bands with single TAG,**reuse the Rel-16/17 values for the length of DL interruption as specified in TS 38.133.*

***Proposal 2:*** *For Rel-18 Tx switching across 3/4 bands with single TAG,**reuse the Rel-16/17 agreement on the starting symbol of DL interruption, i.e., the DL interruption starts from the first OFDM symbol which fully or partially overlaps with the UL switching period.*

We had the following proposals on UL outage time for Tx switching with 2 TAGs:

***Proposal 3:*** *For UL outage time for Tx switching with 2 TAGs, if needed, the following proposals submitted to RF session in [4] can also be discussed in RRM session:*

* *For deriving the UL outage time, use half of the difference between the actual TAs on the two TAGs.*
* *For the timing and measurement error, 3 aspects need to be considered, including: a) BS synchronization accuracy, b) UE transmit timing error, c) TA quantization error.*
  + *For BS synchronization accuracy for synchronized network, the BS synchronization accuracy requirement of 3us defined in clause 7.4.2 of TS 38.133 can be used.*
  + *For UE transmit timing error, the requirement defined in clause 7.1 of TS 38.133 can be seen an upper bound, and the sum of maximum UE transmit timing error is 1.56 us for the carriers with 2 TAGs.*
  + *For TA quantization error, as defined in TS 38.213, it can be up to 5.2 us for 15 kHz SCS.*

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

**Discussion:**

Apple: we agree with 1 TA caes we could reuse R16 R17 requiremetns. On 2TAGs we need to consider MTTD and MRTD. It is typically for non collocated so new MTTD and MRTD are needed. We need to wait RF session conclusion on the RF outage for UL. Clarification is needed on the definition of outage.

Huawei: regarding DL interruption, we reuse legacy requirements as baseline. Considering 2TAG, it is non collocated cases. On UL outage we think in RRM we didn’t discuss the concept of UL outage. It is different from interruption for DL. We need a clear definition of the outage.

Ericsson: regarding TA quantization error, 5.2us is too high but 0.26us should be the number.

Nokia: regarding MRTD, in legacy Tx switching 3us is adopted for collocated cases. Is it necessary to change this assumption? On UL outage, we have concern on the definition not being clear.

Vivo: on P1 and P2, we agree with them. Regarding 2TAG, the scope for UL outage needs clarification. We think DL interruption time can be the same with UL outage time. What is the assumption about actual TA CT mentioned?

Samsung: on P1 and P2, we agree with them. On 2TAG cases, there is no impact. On DL timing, we think outage time considers the RF conclusion. The details need more discussion on the exact values.

CMCC: 1TA cases are clear. On 2TAG cases, let’s minimum MRTD requirements compared to the existing ones. In practice it is difficult to enhance the requirements. On UL outage, we don’t need to discuss this in RRM session. We leave it to RF discussion.

Apple: to reply, on MRTD enhancements since we need to consider 2TAG cases. 2TAG cases are considered under non collocated deployments. The typical numbers for MRTD in non collocated deployment need further discussion. Maybe we could copy interband MRTD.

China Telecom: we agree with CMCC on 1TA cases. There are comments on applied MRTD values and actual TA differences. We can still apply MRTD values existing or we extend the values can be discussed. Regarding the definition for UL outage and its impact on RRM requirements, it is up to RRM discussion how RRM room handles it. In RF room, if there is any suggestion from RRM, it can be informed to them. The UL outage has been discussed in the RF session. We are OK with not discussing it in the RRM room. Regarding UL outage we can further check the assumptions on the TA quantization errors.

**R4-2215613 On R18 CA enhancement - RRM**

*Type: discussion For: Discussion  
 Source: Apple*

**Abstract:**

In this contribution, we provide initial discussion on RRM aspect of R18 CA enhancement. After discussion the following conclusions are provided:

**Proposal 1: RAN4 needs to study interruption related requirement to support UL Tx switching across multiple bands.**

**Proposal 2: interruption on other serving cells when UL Tx switching occurs across multiple bands shall be defined as:**

**Proposal 3: switching period is being discussed in RF session and the outcome can be reused in interruption design.**

**Proposal 4: TA adjustment uncertainty remains same as legacy.**

**Proposal 5: RAN4 shall discuss the supported MRTD in this work item.**

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

**Discussion:**

**R4-2216715 Discussion on RRM requirements for UL Tx Switching Across 3 or 4 Bands**

*Type: discussion For: Discussion  
 Source: Samsung*

**Abstract:**

In this contribution, we provided our viewpoints on the RRM aspects for this work item, accordingly the following observations and proposals are obtained:

**Observation 1: In Rel-16 and Rel-17 UL TX switching, RAN4 requirements apply for the case of co-located and synchronized network deployment with the max receiving timing difference of 3us between the two carriers, which is reflected in time mask requirement in TS38.101-1/3.**

**Observation 2: In RF session, it is agreed to ”limit number of TAGs to up to 2 for all the cases in the Rel-18 WI”.**

**Proposal 1: No impact on the existing MTTD requirement due to the extension of UL TX switching for 2 bands from 1 TAG to 2 TAGs.**

**Observation 3: Neither the starting point nor the length of DL interruption specified for UL TX switching for 2 bands is relevant to the timing relationship between two carriers.**

**Proposal 2: No impact on the existing DL interruption requirement due to the extension of UL TX switching for 2 bands from 1 TAG to 2 TAGs.**

**Proposal 3: Confirm the three factors should be considered in RF session for UL outage time: (1) UL switching time (UE capability), (2) the difference between the TA on the two TAGs, up to MTTD, and (3) timing and measurement error.**

**Observation 4: For DL timing tracking, the estimation of DL timing error can be based on the tracking accuracy depending on the total bandwidth covered by SSB/TRS and the UE clock drift between two consecutive transmissions of SSB/TRS.**

**Proposal 4: RRM session confirm the typical value of 27ns for the FR1 UE’s DL timing error based on TRS.**

**Observation 5: In the signaling design for uplinkTxSwitching-DL-Interruption, there is full flexibility for UE to claim whether the interruption exists or not on any DL carrier(s).**

**Proposal 5: The DL interruption requirement for UL TX switching across 3/4 bands can be defined comparable to the requirements in 8.2.2.2.10/10A/10B/10C for two bands.**

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

**Discussion:**

**R4-2216310 Discussion on RRM core requirements for multi-carrier enhancements**

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

**Abstract:**

This contribution provides the consideration on Multi-carrier enhancements. The following proposals are provided:

**Observation 1: “timing and measurement error” is included in MTTD.**

**Observation 2: The impacted UL OFDM symbols of Option 1 and option 2 @ 15kHz and 30kHz SCS of victim cell are the same, however they are different @60kHz SCS.**

* **Option 1: Impacted UL OFDM symbols= Ceiling (switching period/symbol length) +1 OS**
* **Option 2: Impacted UL OFDM symbols= Ceiling ((switching period+ MTTD)/symbol length)**

**Observation 3: The UL timing difference on two bands in different TAG shall be considered, however Option 1 is more accurate for calculating the impacted UL OFDM symbols in 2 TAGs scenario.**

**Observation 4: The concept of “UL outage” shall be clarified. It refers to the actual interruptions or the possible range of interrupted OSs (like a potential interruption window)?**

**Observation 5: DL interruption requirements in R17 UE Tx switching between two bands can be reused regardless of single TAG and 2TAGs.**

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

**Discussion:**

**R4-2215496 RRM requirements for multi-carrier enhancements**

*Type: discussion For: Decision  
 Source: CMCC*

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

**R4-2215788 RRM core requirements for multi-carrier enhancements**

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

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

**R4-2215872 Discussion on RRM impacts for mulit-carrier enhancement**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216424 RRM impact**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

RRM impact

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

6.19.4 Moderator summary and conclusions

**[104-bis-e][221] NR\_MC\_enh\_RRM, AI 6.19.3 – Jing Han**

**R4-2216932 Email discussion summary for [104-bis-e][221] NR\_MC\_enh\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-13**

**Topic #1 DL interruption for Tx switching across 3/4 bands**

**Issue 1-1: RRM impact due to Rel-18 Tx switching across 3 or 4 bands**

* Proposals
  + Option 1(CMCC, Nokia, China Telecom, vivo, Huawei, Ericsson, Samsung, Apple): DL interruption requirements are to be specified
  + Option 2 (Samsung): No impact on the existing MTTD requirement due to the extension of UL TX switching for 2 bands from 1 TAG to 2 TAGs.
* **Note: Option 1 and option 2 don’t conflict. Please comment on both options.**

**Discussion:**

**Agreement:**

**Issue 1-5: DL interruption is applicable for ENDC**

* Background
  + RAN1 #109 conclusion: EN-DC cases are out of scope for Rel-18 UL Tx switching.
* Proposals
  + Option 1(Ericsson): Same principle applies for ENDC, i.e., DL interruptions in TS 38.133 are not affected, even if the time masks in UE RF requirements might have to be different.

**Discussion:**

**Agreement:**

6.20 Further NR mobility enhancements

6.20.1 General and work plan

6.20.2 Study of improvement on FR2 SCell/SCG setup/resume

**R4-2215424 Discussion of improvement on FR2 Scell/SCG setup/resume**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215446 Discussion on improvement on FR2 SCell/SCG setup/resume**

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

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

**R4-2215458 Discussion on improvement of FR2 Scell and SCG setup**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215518 Discussion on FR2 SCell/SCG setup/resume**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2215609 On R18 mobility enhancement - new RRM measurement during RRC connection setup**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215723 Discussion on FR2 SCell/SCG setup/resume**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215816 Discussion on improvement on FR2 Scell SCG setup resume**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215862 Discussion on the improvement on FR2 SCell/SCG setup/resume**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2215961 Discussion on Study of improvement on FR2 SCell/SCG setup/resume**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

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

**R4-2216309 Discussion on improvement on FR2 SCell/SCG setup/resume**

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

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

**R4-2216342 Discussion on Study of improvement on FR2 SCell/SCG setup/resume**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution presents views on Idle/Inactive early measurement study on FR2 for SCG/Scell setup

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

**R4-2216867 Enhancement of FR2 cell measurements in RRC non-connected mode**

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

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

6.20.3 L1/L2 based inter-cell mobility

**R4-2215359 Discussion on RRM impacts from R18 L1/L2 mobility**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215425 Discussion on L1/L2 based inter-cell mobility**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215447 Discussion on L1/L2 mobility**

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

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

**R4-2215459 Discussion on L1/L2 based inter-cell mobility**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215519 Discussion on Lower Layer Mobility, LLM**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2215608 On R18 mobility enhancement - L1/L2 inter-cell mobility RRM**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215724 Discussion on L1/L2 based inter-cell mobility**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215817 Discussion on L1L2 based inter-cell mobility**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215957 Discussion on L1/L2 based inter-cell mobility**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

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

**R4-2216308 Discussion on L1/L2 based inter-cell mobility for mobility latency reduction**

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

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

**R4-2216367 Discussion on RRM aspects in R18 L1L2 mobility**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216831 Discussion on L1/L2 based inter-cell mobility**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss L1/L2 based inter-cell mobility

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

6.20.5 Moderator summary and conclusions

**[104-bis-e][222] NR\_Mob\_enh2\_part1, AI 6.20 and 6.20.3 – Miao Wang**

**R4-2216933 Email discussion summary for [104-bis-e][222] NR\_Mob\_enh2\_part1**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**[104-bis-e][223] NR\_Mob\_enh2\_part2, AI 6.20.2 – Qiming Li**

**R4-2216934 Email discussion summary for [104-bis-e][223] NR\_Mob\_enh2\_part2**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

6.21 Dual Tx/Rx Multi-SIM for NR

6.21.1 General and work plan

6.21.2 RRM requirements for Rel-17 MUSIM gaps

**R4-2215469 Discussion on RRM requirements for Rel-17 MUSIM gaps**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215615 On R18 MUSIM enhancement - RRM**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215725 Discussion on RRM requirements for Rel-17 MUSIM gaps**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215826 Discussion on RRM requirements for Rel-17 MUSIM gaps**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215969 Considerations on RRM requirements for R17 MUSIM gaps**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216335 Discussion on RRM requirements for MUSIM gaps**

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

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

**R4-2216459 Discussion on MUSIM gaps**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the requirement for MUSIM gaps

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

**R4-2216513 Discussion on MUSIM requirements**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216724 On requirements for Rel-17 MUSIM gaps**

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

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

**R4-2216761 Discussion on RRM requirements for MUSIM gaps**

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

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

6.21.3 Moderator summary and conclusions

**[104-bis-e][224] NR\_DualTxRx\_MUSIM, AI 6.21 – Xusheng Wei**

**R4-2216935 Email discussion summary for [104-bis-e][224] NR\_DualTxRx\_MUSIM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-14**

**Issue 1-1-3: Priority of MUSIM against other legacy gaps**

* Proposals
  + P1: Up to network configuration (CMCC oppo vivo)
  + P2: If an explicit priority level is not provided for MUSIM gaps via signalling, MUSIM gaps are assumed to have higher priority than all measurement gaps configured by the network. (Qualcomm)
  + P3: Aperiodic MUSIM gap is always prioritized over legacy MG in NW A. (Huawei Ericsson)
  + P4: When MUSIM gaps collide with legacy MG, (Ericsson)
    - MUSIM paging and AGC occasions should have higher priority than NW-A MG
    - The priority between other MUSIM gaps and legacy MG can be indicated by NW
* *Recommendations for 2nd round:*
* *Could company check whether priorities are introduced to Rel-17 MUSIM gap configuration signaling is agreeable or not.*
* *If priority is introduced to each individual MUSIM gaps, priority of MUSIM gaps other than aperiodic and MUSIM gap for paging purpose are up to network configuration; FFS on how to configure priority for aperiodic MUSIM gap and MUSIM gap for paging purpose*
* *Send an LS to RAN2 to ask introduction of the priority for each MUSIM gap*

**Discussion:**

Nokia: we need to understand more on which kind priority is the one that we need. There are many proposals.

Ericsson: we want companies to further think about it. In R17 gaps are only for measurements. Now in R18 MUSIM gaps are used not only for measurements but other functions. The rules are different. For paging gaps, it needs high priority on network B to guarantee performance. A common understanding is needed on the principle of whether we need to differentiate gaps for different usages? We need to further discuss whether we need to guarantee network B performance at all?

Apple: regarding LS to RAN2, we support it. We start from the priority specified for concurrent gaps. From the network A point of view, it does not know about the usage of the MUSIM gaps. We could not differentiate the usage when specifying the priority. We think network A prioritize over B in general.

Vivo: we will not include how the priority is introduced in the LS but only the fact that we need it. There is always MUSIM gaps on the network B measuremetns. We definitely need priority.

MediaTek: we support sending LS to RAN2. Regarding the indication to adjust priority, can we include it in the same LS? We don’t have to define priority in a case by case manner. It helps UE since UE knows better what activities in network B are higher prioritized than others.

Qualcomm: to Nokia, last time we agree to use priority to solve collisions. There is no signalling in place to do that so we could send the LS to RAN2. We believe that the UE is able to provide some info to the network. RAN2 already discussed about differentiation according to usage but there is no agreement on that. The best thing is to let the UE tell network A about the priority it prefers and the network has always the right to not listen. We support the LS. If RAN2 does not specify signalling, we will specify a predefined rule in RAN4 spec.

Huawei: we support to have the priority. Network A finally decides the priority ultimately. It is not for the UE to decide. It is up to network A configuration.

OPPO: we also support to introduce priority rule. It is up to network A implementation which priority is configured. How to configure the priority can be based on UE info. It is RAN2 discussion.

Vivo: to MTK, there will be separate LS-s. regarding UE indication, at less we are open to discuss it. Before that we need to have the priority.

MediaTek: regarding vivo comments, we prefer to send one single LS. To Huawei, it is always network decision even if UE indicates the info.

Nokia: we don’t have issue on sending LS to tell RAN2 to introduce the priority. We have concern on how to specify the priority. To Qualcomm, are we discussing R18 requirements? We are not talking about R17 signalling.

Ericsson: we have different views on priority indications. All the decision is made by network, thus we don’t need info from the UE. Maybe only paging gaps are necessary to be known to network A.

Qualcomm: we will ask RAN2 to introduce signaling to carry priority. We want that same field for concurrent also applied for MUSIM, maybe something new. MUSIM gaps are not for network A. we don’t want to create arbitrary interruptions so we use the MUSIM gaps. If we make it harder for the UE to move away, the feature is harmed in general.

**Agreement:**

* RAN4 agrees on introduction of the priority for MUSIM gaps

**Tentative Agreement:**

* Send an LS to RAN2 about the outcome of RAN4 discussion

**Issue 1-4-1: Priority assignment for MUSIM gaps**

* Proposals
  + P1: Priority of MUSIM gaps, including both periodic and aperiodic gaps, should be up to NW configuration (oppo CMCC Huawei)
  + P2: Whether UE could request priority should be discussed in RAN2 (oppo)
  + P3-a: UE should be allowed to request appropriate priorities for different MUSIM gaps from NW A (Qualcomm MTK xiaomi);
    - Request RAN2 to introduce optional signalling so that the UE can request the priority level of MUSIM gaps (Qualcomm MTK)
  + P3-b: Regarding priority assignment for MUSIM gaps, network A can fulfil this task with the facilitation from UE side when UE requesting MUSIM gaps. A LS should be sent to RAN2 after RAN4’s solution is stable. (vivo)
  + P4: Define gap priority for MUSIM gaps that depend on the gap purpose; Network A should be able to configure MUSIM gap priorities for each purpose; RAN4 to study how mobility conditions can be taken into account for the MUSIM gap priorities. Send LS to RAN2 asking how priority can be specified for MUSIM gaps and legacy gaps. (Nokia)
* *Recommendations for 2nd round:*
* Check “UE can indicate priority or other information such as usage for each MUSIM gap when it requests MUSIM gaps” is agreeable or not.

**Discussion:**

**Agreement:**

**Issue 1-1-4: Solutions for collision between MUSIM gap and legacy measurement gap**

* Proposals
  + P1: Priority based solution is reused for gap collision handling between MUSIM gap and legacy gaps. (Apple CMCC vivo xiaomi)
    - Option 1a: For priority-based solution, priorities can be allocated to each existing gap patterns and when two or more gaps collide, only the highest priority gap is kept and all other gaps are dropped (Apple vivo xiaomi)
    - Option 1b: Further optimization can also be considered and it FFS at current stage. (Apple)
  + P2: On top of priority-based solution, RAN4 shall also study the gap sharing based solution, at least for the scenario equal priority is assigned for different gap patterns. (Apple)
  + P3: When MUSIM gaps collide with legacy MG, RAN4 to differentiate different usages of the MUSIM gaps, such as L3 measurement for cell reselection, paging monitoring etc; (Ericsson)
    - The paging for NW-B cannot be dropped when the paging occasion is colliding with MG in NW-A.
    - The SSB for paging AGC retuning in NW-B cannot be dropped when the SSB occasion is colliding with MG in NW-A if the time distance between the SSB and paging occasion is less than 160ms
    - Whether priority rule or sharing rule will be applied for other MUSIM gaps is FFS
  + P4: RAN4 to study how mobility conditions can be taken into account for the MUSIM gap priorities (Nokia)
* *Recommendations for 2nd round:*
* *Priority based solution is reused for gap collision handling between MUSIM gaps and normal gaps of NW A except for the case below,* 
  + *For the collision between aperiodic MUSIM gap / MUSIM gap for NW B paging purpose and normal gaps for NW A:*
  + *Priority based solution*
  + *Other solutions*

**Discussion:**

**Agreement:**

**Issue 1-2-2: Solutions for collision between different MUSIM gaps**

* Proposals
  + Option 1: Priority rule can be used as baseline for collision between different MUSIMs (CMCC MTK vivo)
    - Option 1a: Aperiodic gap should have higher priority than periodic gaps once collision happens within MUSIM gaps (Ericsson MTK)
  + Option 2: MUSIM gaps could be kept when different MUSIM gaps collide (Ericsson Huawei Qualcomm)
    - Option 2a: MUSIM gaps are not dropped due to collision with another MUSIM gap (Huawei, Ericsson)
    - Option 2b: (Ericsson)
      * When the time duration between the two closest gap occasions within the two measurement gap patterns is shorter than [4]ms and the second gap occasion is for paging, UE should keep both gap occasions instead of dropping any of them.
      * RAN4 to further identify the specific scenarios in which any MUSIM gap shall be dropped case by case
    - Option 2c: If multiple MUSIM gap instances overlap or occur back-to-back, they are merged into a single instance comprising the union of the individual gap instances (Qualcomm)
      * If the distance between two MUSIM gap instances is ≤ X ms, they are merged into a single instance comprising the union of the individual gap instances and the space between them
      * If the distance between two MUSIM gap instances is > X ms, both individual gap instances are kept separately.
* *Recommendations for 2nd round:*
* *Suggest company to check whether the following is agreeable or not*
* *Solutions for collision between different MUSIM gaps is either down-selected from option 1 or option 2 in issue 1-2-2; or based on both option 1 and option 2 in issue 1-2-2.*

**Discussion:**

**Agreement:**

6.24 NR Network-controlled Repeaters

6.24.3 Study of RRM function and RRM core requirements

**R4-2216289 Initial discussion on RRM impacts for NR network-controlled repeaters**

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

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

**R4-2216554 Discussion on RRM requirements for NCR-MT in Rel-18**

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

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

**R4-2216862 Impact of RRM on network controlled repeater**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper analyzes the impact of RRM requirements on network controlled repeater

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

6.24.4 Moderator summary and conclusions

**[104-bis-e][225] NR\_netcon\_repeater\_RRM, AI 6.24.3 – Aijun Cao**

**R4-2216936 Email discussion summary for [104-bis-e][225] NR\_netcon\_repeater\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-13**

**Issue 2-1-1: Should RAN4 study on RRM requirement be done after RAN2 has made agreement on the corresponding RRM procedure(s)?**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussion:**

Moderator: R4-2216862 can be presented quickly for this issue.

Session Chair: the core part end point could be Dec. 2023. There is no hurry on specifying detailed RRM requirements before RAN2 makes the conclusions on all the related NCR-MT procedures.

ZTE: RAN4 should follow RAN2 procedure. But transmit timing requirements are not depending on RAN2 procedure. NCR-MT is pretty much the same with IAB MT. we think RRM procedures can be reused. We should start on the ones that are not depending.

Qualcomm: some are not decided yet but something are not depending. We should start with those and we will have enough time when conclusions are ready.

Nokia: we agree with Ericsson. It does not make if we discuss the procedures that are not decided by RAN2. We also think we can start with other things that are not depending on procedures. For timing maybe cases supported are the ones we need to wait for conclusions.

Apple: the proposed agreement is obvious. We agree with also that RAN4 can start with the independ items so we can start. A question on the plan: we need to understand more on RAN2 plan in case if they are too late on anything we need to cope with that. Let’s consider the requirements case by case.

Ericsson: it is difficult to identify the ones which are independent. It is not simple matter on timing requirements. We cannot just reuse the requirements for IAB-MT. we are afraid if we do the work in vein somehow. Our suggestion is to wait for some level of progress in the other groups.

Pivotal: we agree that we should wait until RAN2 concludes. Only if the requirements which are very clear to the group that those are ready to be discussed should be discussed.

CMCC: only is a bit strong. This discussion on RAN4 work is BAU. Our suggestion is to have softened wording.

ZTE: we are fine with the agreements. On timing cases, we need to consider the R16 IAB MT instead of R17.

Ericsson: about timing ZTE mentioned, we need to be careful on reusing anything. We need to ask RAN1 before we start if there is any impact.

Nokia: similar view with Ericsson. On the work plan, it seems that the work plan needs updates.

**Agreement:**

* The RAN4 study on RRM requirement for RRM procedure should start after that procedure has been agreed by RAN1 and/or RAN2.
* RAN4 starts study on the requirements which are not depending on RAN1/2 conclusions.

**Issue 2-3:**

* Proposal: CA/NR-DC/EN-DC is not supported for NCR-MT in Rel-18.

**Discussion:**

Moderator: R4-2216554 can be presented quickly for this issue.

**Agreement:**

7 Rel-18 Work Items for LTE

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

7.5.6 RRM core requirements[LTE\_NBIOT\_eMTC\_NTN\_req-Core

**R4-2215506 Discussion on RRM core requirements for LTE NB-IoT and eMTC NTN**

*Type: discussion For: Discussion  
 Source: CMCC*

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

**R4-2215507 draft CR on RRC re-establishment and timing requirement for eMTC UE in IoT-NTN**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: (Rel-18)  
  
 Source: CMCC*

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

**R4-2215753 RRM requirements for LTE NB-IoT/eMTC over NTN**

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

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

**R4-2215754 Introduction of cell re-selection and PUR requirement for UE category NB-IoT for Satellite Access**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: MediaTek inc.*

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

**R4-2215755 Introduction of RRC Re-establishment requirement for NB-IoT UEs for Satellite Access**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: MediaTek inc.*

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

**R4-2215756 Introduction of measurements requirement for UE category NB-IoT for Satellite Access**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: MediaTek inc.*

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

**R4-2215757 Introduction of Random Access Requirements for Cat-M1 UEs for Satellite Access**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: MediaTek inc.*

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

**R4-2216269 Discussion RRM requirements for IoT NTN**

*Type: LS out For: Approval  
 to RAN2  
 Source: Huawei, HiSilicon*

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

**R4-2216270 DraftCR on RRM requirements for NB-IoT for IoT NTN**

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

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

**R4-2216339 CR on HO and measurement requirements for eMTC over NTN**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: Huawei, HiSilicon*

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

**R4-2216468 Discussion on Core Requirements for IoT NTN**

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

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

**R4-2216505 Draft CR on RLM for category M1 UE for SA**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

RLM for M1 UE for Satellite Access

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

**R4-2216767 Discussions on NTN IoT RRM requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

A contribution discussing the RRM imapct of NTN IoT work item.

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

**R4-2216768 IDLE mode requirements for IoT NTN (cat-M)**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

This CR contains the IDLE mode requirements for IoT NTN for cat-M Ues.

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

**R4-2216860 Draft CR on RRC release with redirection non-anchor NB-IoT carrier for satellite access in 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

The draft CR defines requirements for RRC release with redirection for NB-IoT with satellite access based on the work split in R4-2214350.

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

**R4-2216861 Draft CR on RRC release with redirection for Cat-M1 for satellite access in 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: B (Rel-18)  
  
 Source: Ericsson*

**Abstract:**

The draft CR defines requirements for RRC release with redirection for Cat-M1 with satellite access based on the work split in R4-2214350.

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

**R4-2216864 draft CR of UE UL Timing Requirements for IoT NTN**

*Type: draftCR For: Endorsement  
 36.133 v17.7.0 CR- rev Cat: (Rel-17)  
  
 Source: Qualcomm Incorporated*

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

**R4-2216869 RRM requirements of IoT NTN**

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

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

7.5.7 Moderator summary and conclusions

**[104-bis-e][226] LTE\_NBeMTC\_NTN\_RRM, AI 7.5.6 and 8.2.1 – Hsuanli Lin**

**R4-2216937 Email discussion summary for [104-bis-e][226] LTE\_NBeMTC\_NTN\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

8 Liaison and output to other groups

8.1 R18 related

8.1.1 Maximum uplink timing difference for multi-DCI multi-TRP with two TAs (R1-2205593)

**R4-2215461 Further discussion on Maximum uplink timing difference for multi-DCI multi-TRP with two Tas**

*Type: discussion For: Discussion  
 Source: Xiaomi*

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

**R4-2215614 On R18 eFeMIMO - MTTD for multi-DCI mult-TRP with two TAs**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2216290 On maximum uplink timing difference for multi-DCI multi-TRP with two Tas**

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

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

**R4-2216368 Discussion on maximum uplink timing difference for multi-DCI multi-TRP with two TAs**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216410 Multiple TA for multi-TRP deployments limits**

*Type: other For: Approval  
 Source: InterDigital Communications*

**Abstract:**

In this contribution we are discussing the possible MRTD and MTTD values for intra-cell-and inter-cell mTRP for STxMP and propose next steps.

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

**R4-2216605 Maximum uplink timing difference for multi-DCI multi-TRP with 2 TAs**

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

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

**R4-2216716 Discussion on maximum uplink timing difference for Multi-DCI Multi-TRP with two TAs**

*Type: discussion For: Discussion  
 Source: Samsung*

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

**R4-2216832 Discussion on maximum uplink timing difference for multi-DCI multi-TRP with two TAs**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss MTTD for multi-DCI and multi-TA

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

**R4-2216833 Reply LS on maximum uplink timing difference for multi-DCI multi-TRP with two TAs**

*Type: LS out For: Approval  
 to RAN1  
 Source: Ericsson*

**Abstract:**

In this contribution, we propose LS out to RAN1 for MTTD for multi-DCI and multi-TA

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

8.2 R17 related

8.2.1 UL Segmented Transmission for UL synchronization for IoT NTN (R1-2205642)

**The tdocs in this sub-agenda are treated in the email thread [226].**

**R4-2216255 Views on RAN4 action on UL Segmented Transmission for UL synchronization for IoT NTN**

*Type: other For: Approval  
 Source: Sony*

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

**R4-2216271 Discussion on UL Segmented Transmission for UL synchronization for IoT NTN**

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

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

**R4-2216469 Discussion on UL segmentation for IoT NTN**

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

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

**R4-2216766 UL Segmented Transmission for UL synchronization for IoT NTN**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

RAN4 received an LS from RAN1related to UL segmented transmission for UL synchronization for IoT NTN [1].

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

8.2.2 Others

8.3 R15, R16 related

8.4 Moderator summary and conclusions

**[104-bis-e][227] LS\_reply, AI 8.1.1 – Yuexia Song**

**R4-2216938 Email discussion summary for [104-bis-e][227] LS\_reply**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

9 RAN task

**[104-bis-e][228] RAN\_task\_RRM, AI 9.1 – Qian Yang**

**R4-2216939 Email discussion summary for [104-bis-e][228] RAN\_task\_RRM**

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

**Abstract:**

This contribution provides the summary of email discussion and recommended summary.

**Decision: Return to.**

**Conclusions after 2nd round**

**GTW on Oct-13**

**Issue 1-1-1: Aspects to be considered for high-level analysis of the options**

* Proposals
  + Option 1 (vivo): RAN4 provide high level analysis on options for UE performing RLM/BFD/BM when CD-SSB is outside active BWP by considering following aspects.
    - RRM requirements impact
    - Mobility impact
    - Throughput impact
    - Power consumption
    - RS overhead
    - UE complexity
    - Workload
  + Option 2 (MTK): RAN4 shall use the following criteria to provide high-level analysis for the possible solutions to allow the UE to operate with BWP without restriction,
    - The change impact on RAN4 spec,
    - Whether the solution is already in real field,
    - The UE power consumption,
    - Mobility performance,
    - Whether it is a unified solution for both Non-RedCap and RedCap UEs.
  + Option 3 (Huawei): Take into account following for the analysis of options for *bwp-WithoutRestriction*
    - UE power consumption
    - NW overhead
    - Data interruption
    - Synergy with RRM
    - Spec impact
* Recommended WF
  + Whether following aspects/criteria can be used for high-level analysis on options for UE performing RLM/BFD/BM when CD-SSB is outside active BWP?
    - RRM requirements impact (Spec impact)
    - Mobility performance impact
    - Throughput impact (Data interruption)
    - UE power consumption
    - NW overhead (RS overhead)
    - UE complexity
    - Availability of the solution in real field
    - Applicability to Non-RedCap UE and RedCap UE
    - Workload
  + Note 1: new aspect(s)/criteria are not precluded.
  + Note 2: For the aspects/criteria that are agreeable in the 1st round, detail input on high-level analysis can be discussed and collected in the 2nd round.

**Discussion:**

Qualcomm: this approach is ok to us. On applicability to redcap is not a necessity in the list. This is already part of the workload item. This is about non-redcap UE.

CMCC: we should reduce the aspects listed in general. It is too many to be an efficient feedback to RANP. The workload and RRM impact can be merged. On redcap we propose to remove it. On UE power consumption/complexity, it is difficult to reach consensus. We also propose to remove network overhead.

MediaTek: we agree to CMCC about workload item. On UE consumption, it is very important metric to UE. We shouln’t remove consumption or complexity. Throughput is not an important metric. Nor is network overhead. Non-redcap and redcap UE is important in terms of applying the solutions to certain features.

Ericsson: it is for high level analysis. We have to answer the LS before Nov. meeting. It is difficult to evaluate considering all the aspects. So we need to reduce. To clarify on mobility performance, it is only applied to certain solution but not all. On consumption and complexity it is difficult to reach consensus.

Apple: 1. The ultimate goal of this practice is to help decide which solutions are to be included in the R18 scope. 2. Different companies have difference focuses. We think consumption and complexity are important for us. They should be kept. 3. On applicability of the solution in real field, the situation itself is not typical in the real field.

Huawei: we have same view with MTK on consumption and complexity against overhead and throughput. It is better to use BWP containing SSB if TP is important. We can either discuss and pick the ones with consensus, or we could keep all of them and add all the comments and inputs from RAN4 in the reply.

Nokia: network overhead is relevant. On UE ones we are fine to keep them. A same question with Apple on applicability to the solution in real field. Non-redcap is discussed here only.

Vivo: we agree with Apple that the goal is to downselect the solutions. We prefer to have higher level analysis. From vivo perspective, the first 5 items are more important. Throughput and consumption can be considered together.

OPPO: we prefer to select some of the items. Keeping balance between complexity and network scheduling.

CATT: it is better to have down selection on the items. We think the first 4 items should be included. L1-RSRP performance is important. On real field discussion it means whether it is easily implemented.

Intel: to suggest: let’s select the agreeable items first and leave some as the pending ones and invite more input.

Qualcomm: to propose practically: let’s evaluate only the first one for now.

MediaTek: NCD-SSB is ready in terms of spec.

MediaTek: we do not agree on only considering RRM requirements impact.

Huawei: we are not sure on having two lists.

Apple: RRM impact is not the most important item since we are in R18 and impacts are expected. Let’s consider the outcome if there is no consensus in the end for any item in the additional list. Either RAN4 provides work on the option and prioritize or it is ok to provide as much info as possible. It is not difficult for RANP to digest.

Qualcomm: we can say in the previous LS we didn’t have the chance to have thorough study. And this analysis is following that. Depending on the scenarios, pros and cons are observed.

Vivo: we provide some objective analysis. Please companies take a look. Mobility performance is important.

CATT: cannot we just use the table in issue 1-1-3 and list all the aspects to collect the inputs in 2nd round and to see the whole picture?

Ericsson: we suggest to take the first 4 bullets.

Apple: good suggest from Ericsson. Let’s put consumption and complexity together.

MediaTek: we agree with Ericsson and Apple.

Qualcomm: we should look at the whole picture on consumption and complexity aspects.

Vivo: we also agree with the suggestion.

* **Agreements**
  + RAN4 works on the below aspects/criteria for highest-level analysis on options for UE performing RLM/BFD/BM when CD-SSB is outside active BWP
    - RRM requirements impact (Spec impact) / workload in RAN4
    - Mobility performance impact
    - Throughput impact (Data interruption)
    - UE power consumption / UE complexity
* **Session Chair suggestion in Disucsson:** 
  + RAN4 in addition works on the following aspects/criteria for high-level analysis on options for UE performing RLM/BFD/BM when CD-SSB is outside active BWP;
    - NW overhead (RS overhead)
    - UE complexity
    - Availability of the solution in real field
    - Applicability to Non-RedCap UE and RedCap UE
    - Note 1: Companies are free to comment on the above aspects/criteria based on the prinpicles in note 2; and if consensus is reached, they can be captured in the reply LS
    - Note 2: The principle to down select in the additional list
      * Whether the metric applies to all the solutions
      * The group considers first the more popular ones of the items in the additional list
    - Note 3: if down selection is not reached, RAN4 may report to RANP about all the details to each of the solutions

**Issue 1-1-3: High-level analysis of options**

* Proposals
  + Option 1 (vivo): High level analysis on options for UE performing RLM/BFD/BM when CD-SSB is outside active BWP are provided in Table 1, Table 2, Table 3 and Table 4.

Table 1. Analysis of CSI-RS based RLM/BFD/BM

|  |  |
| --- | --- |
| RRM requirements impact | * CSI-RS based RLM/BFD/BM requirements are already specified. * Timing requirements based on SSB outside active BWP need further discussion. |
| Mobility impact | * Intra-frequency measurement is performed within gap |
| Throughput impact | * As measurement gap needs to be configured, UE cannot be scheduled during measurement gap. |
| Power consumption | * UE works in active BWP. * No RF retuning is needed for CSI-RS based RLM/BFD/BM. * FFS whether RF retuning is needed for UE to meet timing requirements. * As periodicity of CSI-RS is shorter than that of SSB typically, CSI-RS based RLM/BFD/BM measurement period is shorter when no DRX is configured, which would cause higher power consumption. |
| RS overhead | * For UE to meet requirements, CSI-RS should be transmitted with 48 PRBs at least. |
| UE complexity | Low |
| Workload | Low |

Table 2. Analysis of SSB based RLM/BFD/BM with non-gap

|  |  |  |
| --- | --- | --- |
| UE using larger BW without switching | RRM requirements impact | * Applicability of existing requirements for RLM/BFD/BM measurement, including applicability of measurement restrictions and scheduling restrictions, need to defined. |
| Mobility impact | * Intra-frequency measurement is performed w/o gap * Inter-frequency measurement can be performed w/o gap when inter-frequency SSB is within the larger BW |
| Throughput impact | * As gap is not needed for intra-frequency measurement, UE can always be scheduled if no other inter-frequency measurement w/ gap is configured. |
| Power consumption | * UE works in larger BW than active BWP. * No RF retuning is needed. |
| RS overhead | * No additional RS is needed, except CD-SSB being transmitted already. |
| UE complexity | Low |
| Workload | Low |
| UE using larger BW with switching | RRM requirements impact | * Applicability of existing requirements for SSB based RLM/BFD/BM measurement, including applicability of measurement restrictions and scheduling restrictions, need to be specified * Interruption requirements need to be developed additionally to allow UE for switching, or * Interruption requirements with NCSG is developed so that UE is allowed for switching and interruption length and location is known to NW. |
| Mobility impact | * Intra-frequency measurement is performed w/o gap * Inter-frequency measurement can be performed w/o gap when inter-frequency SSB is within the larger BW |
| Throughput impact | * As gap is not needed for intra-frequency measurement, UE can always be scheduled if no other inter-frequency measurement w/ gap is configured. * Interruptions would cause throughput loss. |
| Power consumption | * UE works in larger BW than active BWP. * RF retuning is needed for UE to switch between larger BW and active BWP. |
| RS overhead | * No additional RS is needed, except CD-SSB being transmitted already. |
| UE complexity | Medium |
| Workload | Medium |
| UE using vacant/separate RF chain | RRM requirements impact | * Applicability of existing requirements for SSB based RLM/BFD/BM measurement, including applicability of measurement restrictions and scheduling restrictions, need to be specified * FFS whether interruption requirements need to be developed or not additionally * UE May need to fallback to larger BW when there is no vacant/separate RF available under certain band combinations |
| Mobility impact | * Intra-frequency measurement is performed w/o gap |
| Throughput impact | * As gap is not needed for intra-frequency measurement, UE can always be scheduled if no other inter-frequency measurement w/ gap is configured. |
| Power consumption | * UE needs to turn on vacant/separate RF chain * Depending on whether interruptions are allowed or not, addition RF chain should always be turned on, or it can be on/off switching |
| RS overhead | * No additional RS is needed, except CD-SSB being transmitted already. |
| UE complexity | Medium |
| Workload | Medium |

Table 3. Analysis of SSB based RLM/BFD/BM with gap

|  |  |  |
| --- | --- | --- |
| Shared MG or NCSG for L3 measurement | RRM requirements impact | New requirements should be developed for the gap sharing mechanism.   * Requirements for gap-based RLM * Requirements for gap-based BFD * Requirements for gap-based BM * CCSF for measurements within gaps * Gap sharing mechanism for L1 measurements and L3 measurements. * Others? |
| Mobility impact | * Intra-frequency measurement is performed within gap, and gap is shared with RLM/BFD/BM measurements. There could be mobility performance degradation. |
| Throughput impact | * UE cannot be scheduled within gap. * UE can be scheduled within ML for NCSG gap. |
| Power consumption | * UE works in active BWP. |
| RS overhead | No additional RS is needed, except CD-SSB being transmitted already. |
| UE complexity | Medium |
| Workload | High |
| Dedicated MG or NCSG for RLM/BFD/BM measurements | RRM requirements impact | New requirements should be developed for L1 measurements with dedicated measurement gaps.   * Requirements for gap-based RLM * Requirements for gap-based BFD * Requirements for gap-based BM * CCSF for measurements within gaps * Gap collision handling between L1 gap and L3 gap * Others? |
| Mobility impact | * Intra-frequency measurement is performed within gap, and gap could be collided with L1 gap for RLM/BFD/BM measurements. There could be mobility performance degradation. |
| Throughput impact | * UE cannot be scheduled within gap for L1 and L3 measurements. * UE can be scheduled within ML of NCSG gap for L1 measurements. |
| Power consumption | * UE works in active BWP. |
| RS overhead | * No additional RS is needed, except CD-SSB being transmitted already. |
| UE complexity | Medium |
| Workload | High |

Table 4. Analysis of NCD-SSB based RLM/BFD/BM

|  |  |
| --- | --- |
| RRM requirements impact | * Applicability of existing requirements based on CD-SSB (SSB in existing requirements), i.e., SSB based RLM/BFD/BM and timing requirements, to NCD-SSB |
| Mobility impact | * Intra-frequency measurement is performed without gap |
| Throughput impact | * UE can always be scheduled if no inter-frequency measurement with gap being configured |
| Power consumption | * UE works in active BWP * RF retuning is not needed |
| RS overhead | * NCD-SSB with BW of 24 PRBs needs to be configured. |
| UE complexity | Low |
| Workload | Low |

* + Option 2 (Huawei): Take into account Table 1 for the analysis of options for bwp-WithoutRestriction
* **Table 1: Summary for the comparison between different options**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | UE power consumption | NW overhead | Data interruption | RRM | Spec impact | Feasibility |
| Option a) | Small | CSI-RS | None | MG or NCSG | None | Yes |
| Option b-i) | Large | None | None | None | Small | Yes |
| Option b-ii) | Small | None | Additional interruption with dedicated NCSG  None with shared MG/NCSG | NCSG | Large | Yes |
| Option c) | Small | NCD-SSB | None | None | Small | Yes |

* + Option 3 (MTK): RAN4 can provide the summary and conclusion of all assessment for all the methods studied above in the following table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | CSI-RS | NCD-SSB | Using CD-SSB outside BWP | | |
| Legacy rel-15/rel-16 MG | NCSG | Wider BW or additional RF |
| RAN4 spec impact | No | No | Med | Med | Minor |
| Already implemented in Real field | Yes | No | No for L1 | No | No |
| Higher UE power consumption | No | No | Low | Med | High |
| Impact on mobility performance | No | No | Yes | No | No |
| Unified solution (both RedCap and non-RedCap) | Yes | Yes | Yes | No | No |

* Recommended WF
  + Whether can option 1, i.e., more detailed analysis on the aspects for comparison, be used as baseline to develop high-level analysis of options by further taking conclusions of issue 1-1-1 on the aspects to be used for comparison into account?

**Discussion:**

**Agreement:**

**Issue 1-2-1: Which/how new solution(s) to be supported**

* Proposals
  + Option 1 (Qualcomm):
    - Option B-1 is feasible, i.e. L1 measurements (RLM/BM/BFR) outside active DL BWP are feasible without measurement gap and interruptions
    - A new UE capability for Option B-1 can be introduced, e.g.

| ***Capability-x-y-z***  Indicates support of SSB-based RLM, SSB-based BFD (if supported), SSB-based CBD (if supported), and SSB-based L1-RSRP/L1-SINR measurement (if supported) using SSB that is outside active DL BWP. The SSB is still within the bandwidth of the configured UE-specific carrier. The UE supporting this *Capability-x-y-z* shall also support *bwp-WithoutRestriction*. | Band | No | N/A | N/A |
| --- | --- | --- | --- | --- |

* + - Expected specification changes are expected minimal and limited to TS38.300, TS38.213, and TS38.133.
  + Option 2 (OPPO):
    - It is too late to discuss any new solution in Rel-17 and each solution with pros and cons has not a small impact on specification.
    - UE can be allowed to perform BM/RLM/BFD when the active BWP does not contain SSB, which is up to UE implementation at least in Rel-15/16/17.
    - Any solution is not precluded at this stage, and support to discuss in R18 FeRRM WI
  + Option 3 (CATT):
    - It is typical case that a Rel-18 UE already support FG1-7 and 2-24, so Option a) which does not require any specification effort is generally preferable.
    - If Option A is not sufficient in Rel-18, RAN4 can further discuss the extension of NCD-SSB to non-Redcap UEs in Rel-18. Requirements for Rel-17 Redcap UEs can be taken as a starting point.
  + Option 4 (Apple):
    - RAN4 shall rely on CSI-RS based approach in R17.
    - 3GPP can consider studying the following solutions in R18 RRM enhancement.
      * Perform BM/RLM/BFD based on SSB outside active BWP
        + UE’s capability to operate using larger BW covering SSB outside active BWP, or a UE that is equipped with a separate RF chain
        + BM/RLM/BFD on SSB outside BWP are performed with shared MG or NCSG for L3 measurement, or dedicated MG or NCSG for RLM/BFD/BM measurements.
      * NCD-SSB approach which would work with existing UE hardware architectures (FG6-1) and be compatible with existing RAN4 specifications for BM/RLM/BFD
  + Option 5 (Spreadtrum):
    - It’s proposed to study NCD-SSB for the UEs to support” FG 6-1a BWP without restriction”
  + Option 6 (MTK):
    - RAN4 suggest ranking the methods under study from the best option to the worst option as:
      1. Perform BM/RLM/BFD based on CSI-RS within active BWP.
      2. NCD-SSB approach which would work with existing UE hardware architectures (FG6-1) and be compatible.
      3. Perform BM/RLM/BFD based on SSB outside active BWP:
         1. Using Legacy rel-15/rel-16 MG.
         2. Using NCSG.
         3. Enlarge BW or using additional RF.
  + Option 7 (CMCC):
    - Only UE capability to perform BM/RLM/BFD based on SSB outside active BWP without any interruption or scheduling restrictions should be considered in Rel-18.
  + Option 8 (Huawei):
    - Further consider option b-ii) and option c) for bwp-WithoutRestriction in Rel-18.
      * Option b-ii): there is no CD- or NCD-SSB in the active BWP, and UE measures SSB outside BWP for RLM/BFD/BM, and gap or interruption is allowed for RF re-tuning.
      * Option c): there is no CD-SSB in the active BWP, and NW configures NCD-SSB within active BWP for UE to perform RLM/BFD/BM.
* Recommended WF
  + It was agreed in RAN#97 meeting that no new solution for FG 6-1a shall be added to Rel-17. Therefore, there is no need to discuss solution for Rel-17 anymore.
  + Company is encouraged to provide views on solution(s) for Rel-18.

**Discussion:**

**Agreement:**

9.1 Analysis of options for BWP withoutRestriction

**R4-2215363 Analysis and summary of specification impacts of RAN4 options for FG 6-1a support**

*Type: discussion For: Discussion  
 Source: Intel Corporation*

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

**R4-2215429 Analysis on the options for BWP withoutRestriction**

*Type: discussion For: Discussion  
 Source: CATT*

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

**R4-2215497 Discussion on options for "bwp-WithoutRestriction"**

*Type: discussion For: Decision  
 Source: CMCC*

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

**R4-2215616 On BWP without restriction**

*Type: discussion For: Discussion  
 Source: Apple*

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

**R4-2215729 Discussion on BWP without restriction**

*Type: discussion For: Discussion  
 Source: Spreadtrum Communications*

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

**R4-2215818 Discussion on BWP operation without bandwidth restriction**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: OPPO*

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

**R4-2215871 Discussion on options for BWP without restriction**

*Type: discussion For: Discussion  
 Source: vivo*

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

**R4-2216334 Discussion on options for bwp-WithoutRestriction**

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

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

**R4-2216514 Analysis of options for BWP withoutRestriction**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-18)  
  
 Source: Nokia, Nokia Shanghai Bell*

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

**R4-2216736 Discussion on BWP operation without BW restrictions**

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

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

**R4-2216762 Discussion of BWP operation without bandwidth restriction**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

Discussions and draft LS realted to RAN2 incoming LS related to BWP operation without bandwidth restriction.

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

**R4-2216865 BWP operation without bandwidth restriction**

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

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

10 Revision of the Work Plan

11 Any other business

12 Close of the E-meeting

Report prepared by: MCC