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

**Online Meeting, 10 – 21 October 2022**

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

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

**Electronic Meeting, Online, 15/08/2022 to 26/08/2022**

Report generated on Thursday, 2022-08-11 04:07 UTC

## 1 Opening of the E-meeting

## 2 Approval of the agenda

## 3 Incoming LS and meeting report

### 3.2 Session chair notes

**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-e][200] RRM\_Session | N.A | N.A | N.A | Xizeng Dai Meng Zhang AI 3.2 |
| [104-e][201] Maintenance\_R15\_R16\_RRM | R15/R16 NR (NR\_newRAT-Core/Perf) | Rel-15/R16 NR RRM Core/Perf maintenance | 4.5 | Li Zhang AI 4.8 |
| [104-e][202] Maintenance\_R17\_RRM | R17 RRM maintenance | Rel-17 NR RRM maintenance and TEI 8.2.2 Railway 900MHz RRM | 5.2.3 5.2.4.3 | Yang Tang AI 5.3 |
| [104-e][203] NR\_RF\_FR1\_enh\_RRM | R17 NR FR1 RF (NR\_RF\_FR1\_enh) | RRM Core requirements RRM Perf requirements | 9.3.2 | Han Jing AI 9.3.3 |
| [104-e][204] NR\_RF\_FR2\_req\_enh2\_RRM | R17 NR FR2 RF (NR\_RF\_FR2\_req\_enh2) | RRM Core requirements:  - Inter-band DL CA enhancements - Inter-band UL CA RRM perf requirements | 9.4.5 9.4.6.1 | Lei Du AI 9.4.7 |
| [104-e][205] NR\_HST\_FR1\_enh\_RRM | R17 NR FR1 HST enhancements (NR\_HST\_FR1\_enh) | RRM Core requirements RRM Perf requirements | 9.6.1 9.6.2 | Jingjing Chen AI 9.6.4 |
| [104-e][206] NR\_HST\_FR2\_RRM\_1 | R17 NR FR2 HST (NR\_HST\_FR2) | RRM Core requirement maintenance | 9.7.2 | Dmitry Petrov AI 9.7.5 |
| [104-e][207] NR\_HST\_FR2\_RRM\_2 | R17 NR FR2 HST (NR\_HST\_FR2) | RRM perf requirements | 9.7.3 | He (Jackson) Wang AI 9.7.5 |
| [104-e][208] NR\_RRM\_enh2\_1 | R17 NR RRM further enhancements core maintenance (NR\_RRM\_enh2) | RRM Core requirements maintenance/Perf - General - SRS antenna port switching | 9.8 9.8.1 9.8.1.1 9.8.2.1 | Jerry Cui AI 9.8.3 |
| [104-e][209] NR\_RRM\_enh2\_2 | R17 NR RRM further enhancements core maintenance (NR\_RRM\_enh2) | RRM Core requirements maintenance/Perf - HO with PSCell | 9.8.1.2 9.8.2.2 | Qian Yang AI 9.8.3 |
| [104-e][210] NR\_RRM\_enh2\_3 | R17 NR RRM further enhancements perf requirements (NR\_RRM\_enh2) | RRM Core requirements maintenance/Perf - PUCCH SCell activation/deactivation | 9.8.1.3 9.8.2.3 | Qiuge Guo  AI 9.8.3 |
| [104-e][211] NR\_MG\_enh\_1 | R17 NR measurement gap enhancements (NR\_MG\_enh) | RRM Core requirements maintenance/Perf - General - Multiple concurrent and independent MG patterns | 9.9.1 9.9.1.2 9.9.2.2 | Ato Yu AI 9.9.3 |
| [104-e][212] NR\_MG\_enh\_2 | R17 NR measurement gap enhancements (NR\_MG\_enh) | RRM Core requirements maintenance/Perf - Pre-configured MG pattern(s) | 9.9.1.1 9.9.2.1 | Rui Huang AI 9.9.3 |
| [104-e][213] NR\_MG\_enh\_3 | R17 NR measurement gap enhancements (NR\_MG\_enh) | RRM Core requirements maintenance/Perf - Network Controlled Small Gap | 9.9.1.3 9.9.2.3 | Qiming Li AI 9.9.3 |
| [104-e][214] NR\_NTN\_solutions\_RRM\_1 | R17 NR NTN  (NR\_NTN\_solutions) | RRM requirements maintenance | 9.11.5 | CH Park AI 9.11.8 |
| [104-e][215] NR\_NTN\_solutions\_RRM\_2 | R17 NR NTN  (NR\_NTN\_solutions) | RRM Perf requirements | 9.11.6 | Xuhua Tao AI 9.11.8 |
| [104-e][216] NR\_UE\_pow\_sav\_enh | R17 NR Power Saving enhancements (NR\_UE\_pow\_sav\_enh) | RRM Core requirements RRM Perf requirements | 9.12.1 9.12.2 | Hsuanli Lin AI 9.12.4 |
| [104-e][217] NR\_SL\_enh\_RRM | R17 NR SL enhancements (NR\_SL\_enh) | RRM Core requirements RRM Perf requirements | 9.13.3 9.13.4 | Yoonoh Yang AI 9.13.5 |
| [104-e][218] NR\_ext\_to\_71GHz\_RRM\_1 | R17 NR 52.6 - 71GHz (NR\_ext\_to\_71GHz) | RRM Core requirements maintenance | 9.14.6 | Zhongyi Shen AI 9.14.9 |
| [104-e][219] NR\_ext\_to\_71GHz\_RRM\_2 | R17 NR 52.6 - 71GHz (NR\_ext\_to\_71GHz) | RRM Perf requirements | 9.14.7 | Prashant Sharma AI 9.14.9 |
| [104-e][221] NR\_feMIMO\_RRM\_1 | R17 NR feMIMO (NR\_feMIMO) | RRM Core requirement maintenance | 9.17.2 | Hua Li AI 9.17.5 |
| [104-e][222] NR\_feMIMO\_RRM\_2 | R17 NR feMIMO (NR\_feMIMO) | RRM perf requirements | 9.17.3 | Yiyan Zhang AI 9.17.5 |
| [104-e][223] NR\_redcap\_RRM\_1 | R17 NR RedCap (NR\_redcap) | RRM Core requirements RRM Perf requirements | 9.18.3 9.18.3.1 9.18.4 | Santhan Thangarasa AI 9.18.6 |
| [104-e][224] NR\_redcap\_RRM\_2 | R17 NR RedCap (NR\_redcap) | RRM Core requirements maintenance - Extended DRX enhancements - RRM measurement relaxations - Others | 9.18.3.2 9.18.3.3 9.18.3.4 | Xusheng Wei AI 9.18.6 |
| [104-e][225] NR\_pos\_enh\_1 | R17 NR ePos (NR\_pos\_enh) | RRM requirements maintenance - Latency reduction of positioning measurement  - Impact on existing UE positioning and RRM RRM Perf | 9.19.1 9.19.1.2 9.19.1.4 9.19.2 | Muhammad Kazmi AI 9.19.3 |
| [104-e][226] NR\_pos\_enh\_2 | R17 NR ePos (NR\_pos\_enh) | RRM requirements maintenance - UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation  - Measurement in RRC\_INACTIVE state  - Enhancements of A-GNSS positioning  - Others | 9.19.1.1 9.19.1.3 9.19.1.5 9.19.1.6 | Qiuge Guo AI 9.19.3 |
| [104-e][227] LTE\_NR\_DC\_enh2 | R17 MR-DC enhacements (LTE\_NR\_DC\_enh2) | RRM Core requirements RRM Perf requirements | 9.20 | Han Jing AI 9.20.3 |
| [104-e][228] NR\_IIOT\_URLLC\_enh | R17 NR IIoT/URLLC (NR\_IIOT\_URLLC\_enh) | RRM Core requirements RRM Perf requirements | 9.21.1 9.21.2 | Lars Dalsgaard AI 9.21.4 |
| [104-e][229] NR\_SL\_relay | R17 NR SL Relay (NR\_SL\_relay) | RRM Core requirements RRM Perf requirements | 9.22 | Roy Hu AI 9.22.3 |
| [104-e][230] NR\_SmallData\_INACTIVE | R17 NR small data transmissions in INACTIVE state (NR\_SmallData\_INACTIVE) | RRM Core requirements RRM Perf requirements | 9.23 | Aijun Cao AI 9.23.3 |
| [104-e][231] NB\_IOTenh4\_LTE\_eMTC6\_RRM | R17 NB-IoT and LTE-MTC (NB\_IOTenh4\_LTE\_eMTC6) | RRM Core requirements RRM Perf requirements | 9.24.4 9.24.5 | Zhongyi Shen AI 9.24.7 |
| [104-e][233] FR2\_multiRx\_RRM | R18 NR FR2 multi-Rx chain DL reception | RRM Core requirements for simultaneous DL Rx | 11.8.3 | Qian Yang AI 11.8.4 |
| [104-e][234] NR\_RRM\_enh3 | R18 Even Further RRM enhancement for NR and MR-DC | RRM Core requirements | 11.9 | Jerry Cui AI 11.9.4 |
| [104-e][235] NR\_MG\_enh2 | R18 Further enhancements on NR and MR-DC measurement gaps and measurements without gaps | RRM Core requirements | 11.10 | Ato Yu AI 11.10.4 |
| [104-e][236] NR\_ATG\_RRM | R18 Air-to-ground network | RRM core requirements | 11.12.4 | Shiyuan Wang AI 11.12.5 |
| [104-e][237] NR\_Mob\_enh2 | R18 further mobility enhancement | RRM core requirements | 11.16 | Miao WANG AI 11.16.4 |
| [104-e][238] NR\_DualTxRx\_MUSIM | R18 MUSIM | RRM core requirements | 11.17 | Xusheng Wei AI 11.17.3 |
| [104-e][239] LTE\_NBeMTC\_NTN\_RRM | R18 NB-IoT/eMTC core & perf. requirements for NTN | RRM core requirements | 12.5.5 | Hsuanli Lin AI 12.5.6 |
| [104-e][240] LS\_reply | R18 related | Time difference for MIMO with two TAs (R1-2205593) Feature Group 6-1a(R2-2204009, RP-221870) | 13.1.1Maximum timing MIMO 13.1.4 FG6-1 13.2.1 | Yuexia Song AI 13.4 |

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

### 4.8 Moderator summary and conclusions

**[104-e][201] R15\_R16\_Maintenance, AI 4.5 – Li Zhang**

**R4-2214121 Email Discussion Summary for [104-e][201] Maintenance\_R15\_R16\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214254**

**R4-2214254 Email Discussion Summary for [104-e][201] Maintenance\_R15\_R16\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214324 | WF on R15 and R16 RRM maintenance | Huawei, Hisilicon | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2211541](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211541.zip) |  | Draft CR to FR2 NSA CSI-RS based L1-RSRP measurement | Anritsu Corporation | Agreeable |  |
| [R4-2211544](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211544.zip) | R4-2214659 | Correction on the FR2 inter-frequency relative RSRP accuracy | Anritsu Corporation | Agreeable |  |
| [R4-2211601](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211601.zip) | R4-2214661 | CR: Corrections on LTE V2X Resource Selection Test | Qualcomm, Inc. | Agreeable | Technical changes OK, revised to correct cover sheet |
| [R4-2211608](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211608.zip) | R4-2214662 | Draft CR to TS 38.133: Corrections to NR RRM test cases (Rel 15) | Rohde & Schwarz | Agreeable |  |
| [R4-2211611](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211611.zip) |  | Draft CR to TS 38.133: Corrections to NR RSTD requirements and test cases (Rel 16) | Rohde & Schwarz | Merged | Change 1 to be merged to 3500, Change 2 to be merged to 1717 |
| [R4-2211668](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211668.zip) |  | Draft CR on HST FR1 L1-RSRP test case | CATT | Agreeable |  |
| [R4-2211669](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211669.zip) |  | Correction to FR2 cell re-selection test case | CATT | Merged | To be merged to 2931 |
| [R4-2211715](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211715.zip) |  | Draft CR on R16 NR positioning measurement period requirements | CATT | Merged | To be merged to 3498 |
| [R4-2211716](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211716.zip) | R4-2214665 | Draft CR on R16 NR positioning measurement accuracy requirements | CATT | Agreeable |  |
| [R4-2211717](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211717.zip) | R4-2214666 | Draft CR on R16 NR positioning test cases | CATT | Agreeable |  |
| [R4-2211836](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211836.zip) | R4-2214668 | Draft CR on scheduling restriction for FR2 R15 | Apple | Postponed |  |
| [R4-2211839](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211839.zip) | R4-2214669 | Draft CR on inter-RAT NR-U RSSI and CO measurement without MG in TS36.133 R16 | Apple | Agreeable |  |
| [R4-2211855](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211855.zip) | R4-2214673 | Draft CR on scheduling restrictions for L3 measurements in FR1 (Rel-15) | Apple | Agreeable |  |
| [R4-2211888](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211888.zip) |  | draftCR on applicabiltiy for test Cases involving E-UTRA/FR1 and FR2 carriers (R15) | Apple | Agreeable |  |
| [R4-2211913](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211913.zip) |  | Maintenance CR on scheduling restriction on L1-RSRP measurement (R17) | Apple | Agreeable |  |
| [R4-2211932](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211932.zip) |  | draftCR on inter-frequency measurement without MG | CMCC | Agreeable |  |
| [R4-2212085](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212085.zip) |  | CR on TS38.133 for TC of CSI-RS inter-freq measurement R16 | MediaTek inc. | Agreeable |  |
| [R4-2212162](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212162.zip) | R4-2214687 | CR: SRS carrier switching configuration correction | Qualcomm Ltd. | Agreeable | Technical changes OK, needs to be based on latest spec |
| [R4-2212195](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212195.zip) | R4-2214689 | DraftCR - Correction of margins for UE Rx-Tx accuracy requirements | Qualcomm Incorporated | Agreeable |  |
| [R4-2212251](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212251.zip) |  | [draft CR] R16 Maintenance for 38133 test cases | ZTE Corporation | Agreeable |  |
| [R4-2212253](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212253.zip) |  | [draft CR] R15 Maintenance for 38133 Core | ZTE Corporation | Agreeable | Technical changes OK, one company suggested to start from Rel-17 |
| [R4-2212256](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212256.zip) |  | [draft CR] R16 Maintenance for 38133 Core | ZTE Corporation | Agreeable |  |
| [R4-2212288](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212288.zip) | R4-2214692 | draftCR for test configuration and requirement correction of CSI-RS based RLM OOS test in NR SA | CMCC | Agreeable | Technical changes OK, needs to reflect the change mark for the figure |
| [R4-2212396](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212396.zip) | R4-2214693 | CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement | MediaTek inc. | Agreeable |  |
| [R4-2212522](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212522.zip) |  | Draft CR on TC for known PSCell addition in R15 | MediaTek Inc. | Postponed |  |
| [R4-2212525](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212525.zip) |  | Draft CR on TC for known PSCell addition for CCA in R16 | MediaTek Inc. | Postponed |  |
| [R4-2212529](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212529.zip) |  | Draft CR on TC for typo in SCell activation in R17 | MediaTek Inc. | Agreeable |  |
| [R4-2212922](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212922.zip) | R4-2214702 | Correction to NR SCell interruption requirements 36.133\_r15 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212925](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212925.zip) | R4-2214703 | Correction to NR SCell interruption requirements 38.133\_r15 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212928](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212928.zip) | R4-2214704 | Correction to Rel-15 FR1 test cases\_r15 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212931](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212931.zip) |  | Correction to Rel-15 FR2 test cases\_r15 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212934](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212934.zip) | R4-2214705 | Correction to Rel-16 FR1 test cases\_r16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212936](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212936.zip) |  | Correction to Rel-16 FR2 test cases\_r16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212938](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212938.zip) |  | Correction to NR sidelink core requirements\_r16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212940](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212940.zip) | R4-2214706 | Correction to NR sidelink test cases\_r16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212942](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212942.zip) | R4-2214707 | Correction to DAPS HO test cases\_r16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212944](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212944.zip) |  | Draft CR on maintenance on SCell activation in NR-U Rel-16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212946](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212946.zip) |  | Draft CR on test cases of SCell activation in NR-U Rel-16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2213041](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213041.zip) | R4-2214716 | Draft CR to TS 38.133 Correction to conditional handover requirements(Rel-16) | vivo | Postponed |  |
| [R4-2213043](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213043.zip) | R4-2214717 | Draft CR to TS 38.133 Correction to conditional PSCell change requirements(Rel-16) | vivo | Postponed |  |
| [R4-2213046](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213046.zip) | R4-2214718 | Draft CR to 38.133 correction to NR positioning measurement requirements | vivo | Agreeable |  |
| [R4-2213468](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213468.zip) |  | DraftCR on maintaining PL-RS switching delay requirements R16 | Huawei, HiSilicon | Postponed |  |
| [R4-2213470](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213470.zip) |  | DraftCR on correction of eMIMO test cases R16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2213472](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213472.zip) |  | DraftCR on maintaining interruption test cases for NR V2X R16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2213498](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213498.zip) | R4-2214721 | CR on PRS meausurement period R16 | Huawei, HiSilicon | Postponed |  |
| [R4-2213500](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213500.zip) | R4-2214722 | CR on accuracy requirements for positioning measurement R16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2213502](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213502.zip) |  | CR on inter-frequency measurement without MG R16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2213504](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213504.zip) |  | CR on CSI-RS measurement requirements R16 | Huawei, HiSilicon | Agreeable |  |
| [R4-2213879](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213879.zip) |  | Draft CR on Link Recovery Procedures for TS38.133 R16 | ZTE Corporation | Postponed |  |
| [R4-2213932](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213932.zip) |  | Draft CR to TS 38.133: Correction to NR UE Rx-Tx time difference measurement accuracy requirements | vivo | Agreeable |  |
| [R4-2213934](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213934.zip) | R4-2214731 | Clarification on fine timing requirements for known and unknown cell in HO in FR1 | Ericsson | Agreeable |  |
| [R4-2213935](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213935.zip) |  | SCell activation maintenance in Rel-15 | Ericsson | Agreeable | Please ask for Cat-A draftCRs for Rel-16/17 |
| R4-2211587 | R4-2214505 | Correction of Configuration Parameters for Test 1 in Test Case A.7.1.11 | STMicroelectronics | Agreeable | Technical changes OK, revised to correct CR CAT in the cover sheet |

## 5 Rel-17 maintenance for LTE and NR

### 5.3 Moderator summary and conclusions

**[104-e][202] Maintenance\_R17\_RRM, AI 5.2.3 and 5.2.4.3 – Yang Tang**

**R4-2214122 Email Discussion Summary for [104-e][202] Maintenance\_R17\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214255**

**R4-2214255 Email Discussion Summary for [104-e][202] Maintenance\_R17\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214325 | WF on number of serving carriers in SA | Nokia | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2213749](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213749.zip) |  | Formal CR to 38.133: Corrections on MUSIM gaps | MediaTek inc. | Agreeable, |  |
| [R4-2212030](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212030.zip) |  | CR to MUSIM gap configuration for MUSIM requirements applicability | OPPO | Postponed |  |
| [R4-2212686](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212686.zip) |  | Correction of UE behavior outside gaps | Nokia, Nokia Shanghai Bell | Postponed |  |
| [R4-2212763](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212763.zip) |  | CR on cell reselection in Idle mode | Ericsson | Postponed |  |
| [R4-2212764](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212764.zip) |  | CR on cell selection in Idle mode for NR-U | Ericsson | Not pursued |  |
| [R4-2212876](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212876.zip) |  | CR Correction for suitable cell search in Idle mode | Nokia, Nokia Shanghai Bell | Postponed |  |
| [R4-2212857](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212857.zip) |  | CR on Number of serving carriers in SA | Nokia, Nokia Shanghai Bell | agreeable |  |
| [R4-2213936](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213936.zip) |  | Number of DL CCs in FR2 for NE-DC | Ericsson | Merged with R4-2212857 |  |
| [R4-2211954](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211954.zip) |  | Correction on Measurements of inter-frequency NR cells | Xiaomi | Merged with R4-2213015 in [205] |  |

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**GTW on Aug-25**

**Issue 1-1: mandatory MUSIM gap in R17**

***whether mandatory MUSIM gap needs to be considered in R17***

*Yes: Ericsson, Nokia*

*No: apple, MTK, vivo, OPPO, Qualcomm, Huawei*

*Recommendations for 2nd round:*

*Moderator: Considering this is a TEI item, which is supposed to be concluded in one quarter, it is recommended to follow the majority view that mandatory MUSIM gap is not considered in R17.*

**Discussions:**

**Agreement:**

Mandatory MUSIM gap is not considered in R17. The discussion will continue in R18 MUSIM WI.

**Issue 2-1-2r: Cell Selection in IDLE mode FR2**

**Revised option 1: (Ericsson, Qualcomm, Huawei):**

RAN4 to introduce the max function for timer T = max (10s, [K1]\*N1\*M1\*DRX cycles), where N1 is defined in Table 4.2.2.2-1, and K1 is 16 if DRX cycle is 0.32s, 8 if DRX cycle is 0.64s, otherwise, K1 = 4.

If UE hasn’t found any suitable cell during 10s, UE is allowed to extend the search time to T = max (10s, [K1]\*N1\*M1\*DRX cycles).

**Revised Option 2 (Nokia):**

Max (10 s, T identify\_intra\_without\_index\_FR2 s), where:

- T identify\_intra\_without\_index\_FR2 = N NR\_FR2\_carriers x (T PSS/SSS\_sync\_intra\_FR2 + T SSB\_measurement\_period\_intra\_FR2)

- N NR\_FR2\_carriers is the number of configured NR FR2 carriers

- T PSS/SSS\_sync\_intra\_FR2: For a UE supporting FR2 power class 1 or 5, T PSS/SSS\_sync\_intra\_FR2 =40. For a UE supporting power class 2, T PSS/SSS\_sync\_intra\_FR2 =24. For a UE supporting FR2 power class 3, T PSS/SSS\_sync\_intra\_FR2 =24. For a UE supporting FR2 power class 4, T PSS/SSS\_sync\_intra\_FR2 =24.

- T SSB\_measurement\_period\_intra\_FR2 = 8 x SMTC period for the searched NR FR2 carrier

**Discussions:**

Nokia: DRX cycle is not according to the current spec. it is not clear to use DRX cycle when the UE is searching for new cells.

Ericsson: DRX cycle is the lowest unit we use in IDLE mode. This framework is following the existing reselction requirements. If there is margin to UE for it to try to search and stay in the serving cell it is good tradeoff between mobility and efficiency.

Apple: we are fine with option 1 since UE is allowed to do further measurement after 10s. it provides UE flexibility to choose. Even if T is derived, the requirements tell the UE when to trigger. It is not different in terms of UE behaviour.

Nokia: the problem here is that we are discussing the same thing. Cell detection is not based on DRX cycle. The spec says no matter what power limitation is applied the UE will search for cells. The UE can search for up to 10s and it is completely on UE implementation. In case the UE is configured a large amount of FR2 carriers, the 10s is not enough for the UE to search all those carriers. We need to allow the UE to have additional time to search on all the many carriers.

Ericsson: we had already agreed the same procedure in eDRX cases. We prefer to have same function between different cases in the spec. eDRX is longer than DRX cycle.

**Issue 2-2-2r: Cell Selection in NR-U IDLE mode**

***Proposal (Ericsson): RAN4 to introduce the max function for timer T = max(10s, M1\*(******P1s +K1)\*DRX cycles) for NR-U, where***

* + ***K1 is 16 if DRX cycle is 0.32s, 8 if DRX cycle is 0.64s, otherwise, K1 = 4.***
  + ***P1s is the number of DRX cycles each with at least one SMTC occasion not available during the TPLMN and P1s ≤ P1s,max.***
  + ***P1s,max = [32] if DRX cycle is 0.32s; [16] if DRX cycle is 0.64s, otherwise, P1s,max = [8].***

If UE hasn’t found any suitable cell during 10s, UE is allowed to extend the search time to T = max(10s, M1\*( P1s +K1)\*DRX cycles).

***Proposal 3: The UE shall initiate cell selection procedures for the selected PLMN if P1s exceeds P1s,max.***

**Issue 3-1-2r: FR1/LTE+FR2 test cases in R17**

Proposal: RAN4 to introduce FR1+FR2 test cases for the Rel-17 WIs and future releases WI and define the applicability rule for the introduced FR1+FR2 test cases.

**Agreement:**

RAN4 to introduce FR1+FR2 test cases for the Rel-17 WIs and future releases WI and define the applicability rule for the introduced FR1+FR2 test cases.

## 6 LS response to ITU

## 7 Rel-17 feature list

## 8 Rel-17 spectrum related WIs for NR

## 9 Rel-17 non-spectrum related work items for NR and LTE

### 9.3 RF requirements enhancement for NR frequency range 1 (FR1)

#### 9.3.3 Moderator summary and conclusions

**[104-e][203] NR\_RF\_FR1-enh\_RRM, AI 9.3.2 – Jing Han**

**R4-2214123 Email Discussion Summary for [104-e][203] NR\_RF\_FR1\_enh\_RRM**

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

**Abstract:**

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

**Decision: Noted.**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2212975 | R4-2214519 | Test cases for R17 Tx switching enhancement | Huawei, HiSilicon | Agreeable |  |

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### 9.4 NR RF requirement enhancements for frequency range 2 (FR2)

#### 9.4.7 Moderator summary and conclusions

**[104-e][204] NR\_RF\_FR2\_req\_enh2\_RRM, AI 9.4.5 and 9.4.6.1 – Lei Du**

**R4-2214124 Email Discussion Summary for [104-e][204] NR\_RF\_FR2\_req\_enh2\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214256**

**R4-2214256 Email Discussion Summary for [104-e][204] NR\_RF\_FR2\_req\_enh2\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214326 | WF on RRM requirements for FR2 Inter-band DL CA and UL CA | Nokia | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2212859](file:///C:\DuLei2019\RAN4\RAN4%23103\Docs\R4-2208992.zip) |  | CR for test case on UE UL carrier RRC reconfiguration delay for FR2 | Nokia | Agreeable | Resubmission of endorsed draftCR in RAN4#103e |

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**GTW on Aug-22**

**Topic #1: RRM core requirement maintenance**

**Issue 1-1 Test cases for FR2 inter-band UL CA for IBM**

* Proposals:
  + Option 1: Test case for FR2 inter-band UL CA SCell activation delay with IBM can reuse TC 1-5 and TC 1-6 for PUCCH SCell activation and deactivation delay requirements of FR2 known and unknown cell with inter-band FR2 PCell in PUCCH SCell activation in FeRRM WI directly (Nokia)

**Moderator’s comments:** From the comments received, there seems to be two scenarios for FR2 inter-band UL CA:

Case 1: an SCell is always configured with DL+UL. This is also the understanding from RF people.

Case 2: an SCell is UL only CC. We don’t have any core requirements for this case.

I would propose taking Case 1 as assumption for FR2 inter-band UL CA. Under this assumption, can we conclude existing SCell activation TCs in FR2 inter-band scenarios can be applied? And for Case 2, it is probably too late to open the discussion in this WI. Please comment in 2nd round if you see the necessity.

*Moderator’s Proposal:*

* *In FR2 inter-band UL CA, an SCell is assumed always configured with DL+UL.*
* *Existing SCell activation TCs in FR2 inter-band scenarios can be applied.*

*Recommendations for 2nd round:* Please companies to check if above proposal is agreeable.

**Discussions:**

Ericsson: we are ok with proposal. We don’t have SUL in FR2.

Nokia: we support the proposal.

**Agreement:**

Regarding test cases for FR2 inter-band UL CA for IBM

* In FR2 inter-band UL CA, an SCell is assumed always configured with DL+UL.
* Existing SCell activation TCs in FR2 inter-band scenarios can be applied.

### 9.6 Enhancement for NR high speed train scenario in FR1

#### 9.6.4 Moderator summary and conclusions

**[104-e][205] NR\_HST\_FR1\_enh\_RRM, AI 9.6.1 and 9.6.2 – Jingjing Chen**

**R4-2214125 Email Discussion Summary for [104-e][205] NR\_HST\_FR1\_enh\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214257**

**R4-2214257 Email Discussion Summary for [104-e][205] NR\_HST\_FR1\_enh\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214327 | WF on RRM for FR1 HST | CMCC | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211673 | R4-2214664 | Draft CR on test case for inter-frequency measurement in SA for HST FR1 | CATT | Agreeable |  |
| R4-2211904 | R4-2214676 | draftCR on HST CA enhancement on deactivated SCell (EN-DC) | Apple | Agreeable |  |
| R4-2211930 | R4-2214508 | CR on measurement requirements for FR1 HST | CMCC | Agreeable |  |
| R4-2212415 |  | Maintenance CR for Rel-17 HST in FR1 on 38.133 | MediaTek Inc | Agreeable |  |
| R4-2212976 | R4-2214715 | Test case for CA: enhancement on deactivated SCell (SA) | Huawei, HiSilicon | Agreeable |  |
| R4-2213015 |  | CR on the enhancement for inter-frequency measurement in idle mode for HST | vivo | Agreeable |  |
| R4-2213339 | R4-2214719 | EN-DC event triggered reporting tests for HST FR1 | Ericsson | Agreeable |  |

.

**GTW on Aug-19**

**Topic #2: RRM performance requirements**

**Issue 2-1-1: upper bound of side condition for L1-SINR measurement accuracy**

* Proposals
  + Option 1 (QC, CATT, CMCC, MTK): for L1-SINR measurement accuracy requirements, the upper bound of the side condition is same as R16 intra-frequency SS-SINR, which is 5dB
  + Option 2 (vivo, Nokia, Ericsson):
    - For DPS 1a scenario, if max doppler shift does not beyond TRS tracking ability,
    - No impact to L1-SINR measurement accuracy requirements if the measured RS is associated with active TCI of the UE in DPS 1a scenario, i.e. legacy performance requirements still apply to DPS 1a scenario.
    - No accuracy requirements for L1-SINR measurements on RSs that are not associated with active TCI of the UE in DPS 1a scenario when side condition is above 5dB.
    - For DPS 1b or HST-SFN scenario, no accuracy requirements for L1-SINR measurements when side condition is above 5dB.

**Discussions:**

CMCC: we need to move forward.

Qualcomm: for SINR measurement accuracy, ICI always exists no matter whether the UE measures serving or neighbour cells. Having different requirements among DPS 1a 1b HSTSFN does not make much sense in terms of upper bound.

Vivo: ICI is caused by inperfect DL sync. For DPS 1a the UE achieves good sync. For dedicated IMR, little impact.

Nokia: based on the analysis on the HST FR2, we need to differentiate the type 1 L1-SINR measurements from type 2 and type 3. So we need to differentiate the applicability of L1-SINR accuracy side condition upper bound. Only type 1 L1-SINR meaurements need the upper bound.

Apple: we support option 1.

Qualcomm: option 2 is demanding complexity in implementation. 2 CSI-RS symbols are needed for tracking frequency offset.

Ericsson: we support option 2. Since it looks like a compromise.

MTK: if the beam is associated with the active TCI, the UE can have good accuracy. If not, we need 5dB upper bound.

Nokia: we can compromise to introduce the upper bound only for type 1 SINR measuremetns which is CSI-RS based CMR + no dedicated IMR.

CMCC: we are not ok to introduce only for type 1. Option 1 is the minimum requirement.

**Tentative Agreement:**

For L1-SINR measurement accuracy requirements, the upper bound of the side condition is [6dB].

**Issue 2-2-1: upper bound of side condition for inter-frequency SS-SINR measurement accuracy**

* Proposals
  + Option 1 (QC, CATT, CMCC, MTK): for inter-frequency SS-SINR measurement accuracy requirements, the upper bound of the side condition is same as R16 intra-frequency SS-SINR, which is 5dB
  + Option 2 (Nokia): determine the upper bound of the side condition based on a typical inter-frequency scenario for FR1 HST

**Discussions:**

Nokia: we can compromise to option 1 provided that ‘the upper cound of side condition = 5dB for inter-frequency SS SINR accuracy is derived assuming operating frequency is the same as the intra-frequency case. The upper bound condition should be reassessed if the assumption does not hold.’ is captured.

CMCC: how does inter-frequncy is the same as intra-frequency? Situation is the same between inter and intra frequency cases.

Apple: same question as CMCC.

**GTW on Aug-25**

**Topic #2: RRM performance requirements**

**Issue 2-2-1: upper bound of side condition for inter-frequency SS-SINR measurement accuracy**

For inter-frequency SS-SINR measurement accuracy requirements, the upper bound of the side condition is [5dB].

**Discussions:**

**Agreement:**

For inter-frequency SS-SINR measurement accuracy requirements, the upper bound of the side condition is [5dB].

9.7 NR support for high speed train scenario in FR2

9.7.5 Moderator summary and conclusions

**[104-e][206] NR\_HST\_FR2\_RRM\_1, AI 9.7.2 – Dmitry Petrov**

**R4-2214126 Email Discussion Summary for** **[104-e][206] NR\_HST\_FR2\_RRM\_1**

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

**Abstract:**

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

**Decision: Revised to R4-2214258**

**R4-2214258 Email Discussion Summary for [104-e][206] NR\_HST\_FR2\_RRM\_1**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214469 | WF on HST FR2 RRM Core Requirement Maintenance | Nokia, Nokia Shanghai Bell | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211597 | R4-2214560  R4-2215155 | CR: FR2 HST Scheduling restriction on SSB | Qualcomm, Inc. | Agreeable |  |
| R4-2211676 | R4-2214563  R4-2215156 | CR on RRM core requirements for measurement procedure requirements for HST FR2 | CATT | Agreeable | It is recommended to add Nokia, Nokia Shanghai Bell as a cosigning company to the revision. |
| R4-2213399 | R4-2214625 | CR to 38.133 on UL Transmit Timing in HST FR2 Scenario | Nokia, Nokia Shanghai Bell | Postponed |  |
| R4-2213891 |  | CR to TS 38.133: Clarification of intrafrequency cell identification for FR2 HST | Nokia, Nokia Shanghai Bell | Merged | It is recommended to merge the CR with the revision of R4-2213399 |
| R4-2213892 | R4-2214645 | CR to TS 38.133: SSB-based L1-SINR measurements for FR2 NR HST | Nokia, Nokia Shanghai Bell | Postponed |  |

**GTW on Aug-17**

**Sub-topic 1-1: Large one-step UL timing adjustment**

**Issue 1-1-1: Time period of relaxed UL transmit timing accuracy**

* **Background:** *Following the requirements from Clause 7.1.2.3*
  + *When highSpeedMeasFlagFR2-r17 is configured and highSpeedLargeOneStepUL-TimingFR2-r17 is enabled for UE supporting FR2 power class 6 and [largeOneStepUL-timingFR2-r17] capability*
  + *And the absolute value*
  + *And the new target TCI state is not in the active TCI state list*

*The UE UL transmission timing error after the TCI state switching procedure shall be less than or equal to ±[7Ts].*

* **Proposals and/or Observations**
  + Observation 1 (Nokia): The UE is able to track fine DL timing after the TCI state switch in HST FR2 scenarios even after the large jump in propagation delay and when target TCI state was not in the active TCI state list.
  + Observation 2 (Nokia): Currently, for some UE categories in HST FR2 deployments, it is allowed to transmit in UL with a larger timing error after the TCI state switch (±7Ts instead of ±3.5Ts= Te). It is defined and unclear on the network side when and how the UE shall adjust its timing back within ±Te.
  + Observation 3 (Nokia): In the case of HO, after the HO interruption time (TS 38.133, Clause 6.1.1.4.2), the UE can transmit in UL with the timing error limit within ±Te.
  + **Proposal 1** (Nokia): RAN4 to specify explicitly when the UE shall adjust its UL timing to within ±Te after the TCI state switch, i.e., when it can follow again the reequipments from 7.1.2.1.
  + **Proposal 2** (Nokia): If target TCI state is not in the active TCI state list, limit the time needed for the UE to follow again clause 7.1.2.1 requirements and to adjust its UL timing within ±Te. It should happen not later than Trs + 2ms after the TCI state switch.
* **Candidate options**
  + Option 1 [Nokia]: Adopt Proposals 1 and 2.
  + Option 2: Keep current spec as it is: *The UE UL transmission timing error after the TCI state switching procedure shall be less than or equal to ±Te as specified in clause 7.1.2 if the new target TCI state is within active TCI state list, otherwise ±[7Ts].*
* **Recommended WF**
  + Companies are encouraged to share their understanding whether UL transmit timing accuracy shall be returned to within ±Te=4.5Ts from ±7Ts after the TCI state switch and when.

**Discussions:**

Qualcomm: We do not support Proposal 1 and 2. It is incorrect timing.

Samsung: Core part has been closed. We need discuss whether or not this is blocking issue for UE implementation. For gradual timing change based on the new timing after TCI switching, we do not have detailed requirements for it. But that is intention to allow some flexibility. For P2 we need more time to check.

Nokia: our intention is to clarify the unclear requirement when UE starts to follow the requirement. The accuracy is different. It is important for network to know when accraucy will be followed and what is the requirement. How to understand the procedure. When the legacy requirement can be follow.

Huawei: understand the intention. UE will do gradual timing adjustment following Tq. Duration is not easy to be specified.

Ericsson: Propoal 1 is the restric UE. Besides the TE change, it is important to align the timing definition. We need clarification. We suggest to keep the relaxed requirement +/- 7Ts.

ZTE: we understand the motivation of option 1. For option 2, it is not enough to reflect the condition. Option 2 cannot reflect the trasnsition from relaxed to legacy requirements. We prefer option 1.

Qualcomm: Huawei and Samsung comment makes sense. We can have Tq requirements but not Te part. Both UE and network need to catch up. Network should catch up in N\_TA. It is too complicated to specify it. We can compromise to Tq requirement on it.

Samsung: we have similar view as Qualcomm and Huawei. When defining requirement, we should have ideal timing. What is the ideal timing between points of TCI state switching and going back to normal timing. We cannot find way to do it.

Nokia: the Tq gradual timing will be applied. Tq timing should be applied for this case. The transition time is not specified.

OPPO: we can compromise to follow Tq requirements.

**FFS on the following bullet:**

* The gradual timing adjustement step of Tq shall be applied after the one shot uplink timing adjustment after TCI state switch.

**Issue 1-2-1: Initial UL transmit timing after TCI state switch**

* **Background**

The requirements when large one-step timing adjustment mechanism is enabled are described in Clause 7.1.2.3.

The requirements on the UE initial transmission timing error are described in Clause 7.1.2.

Gradual UL transmit timing adjustment requirements are present in Clause 7.1.2.1.

* **Proposals and/or Observations**
  + Observation 1 (Nokia): Using either network-based (e.g., RACH-based) or large one-shot UL timing adjustment mechanisms, the UE should be able to achieve transmit timing error within ±Te after the TCI state switch. However, no UL timing error requirements are defined explicitly for TCI state switch in TS 38.133.
  + **Proposal 1** (Nokia): RAN4 to introduce UE initial transmission timing error requirement after the TCI state switch.
  + **Proposal 2** (Nokia): UE initial transmission timing error shall be less than or equal to ±Te where the timing error limit value Te is specified in Table 7.1.2-1. This requirement applies when it is the first transmission after the TCI state switch.
  + **Proposal 3** (ZTE): In order to align the understanding from different companies, further clarification on the agreement bout the accuracy of UL transmit timing is necessary. Our understanding is as below:
    - If largeOneStepUL-timingFR2-r17 is disabled, accuracy relaxation is not allowed. Otherwise, accuracy relaxation is allowed possibly and needs further decision by the UE.
    - If largeOneStepUL-timingFR2-r17 is enabled, since the one-shot TA adjustment is triggered by TCI state switching plus the contrast between DL timing difference and the threshold, so immediately after each TCI state switching, UE needs to check whether accuracy relaxation is allowed. The following cases are possible:
      * Case 1: If UE can only track one TCI state
        + If the DL timing difference is above the threshold, the accuracy relaxation is allowed.
        + Otherwise, the accuracy relaxation is not allowed.
      * Case 2: If UE can track multiple TCI states and the target TCI state is not in the list
        + If the DL timing difference is above the threshold, the accuracy relaxation is allowed.
        + Otherwise, the accuracy relaxation is not allowed.
      * Case 3: If UE can track multiple TCI states and the target TCI state is in the list
        + The accuracy relaxation is not allowed no matter whether the DL timing difference is above the threshold or not.
* **Candidate options:**
  + Option 1 [Nokia]: UE initial transmission timing error after the TCI state switch shall be less than or equal to ±Te. Enhance the requirement in 7.1.2.
  + Option 2 [ZTE]: If largeOneStepUL-timingFR2-r17 is enabled, target TCI state is not in the active TCI state list, and the DL timing difference is above the threshold the accuracy relaxation is allowed.
* **Recommended WF**
  + Companies are invited to share their view on the general understanding of UL TX timing accuracy after the TCI state switch.
  + Companies are encouraged to discuss whether a general requirement (Option 1) can be introduced, and/or an exception (Option 2) shall be kept.

**Discussions:**

ZTE: whether companies have common understanding on the previous agreement. Comparison of timing with threshld is missed in the previous agreement.

Qualcomm: Option 2 is good and aligned with the current spec.

Nokia: Option 2 does not conflict with Option 1. Uplink timing should be within Te. For many other cases, it is not clear whether all the requiremetns can be applied.

Samsung: Nokia provide good flow chart. For option 2, this is already reflected in the spec.

Ericsson: Option 1 is identical to the legacy requirements. Since in legacy requirement, we have no limit for timing and why do we need the new requirement. For option 2, we concern whether there is anything new.

Huawei: to option 2, does it mean the agreement last meeting is confirmed or tend to introduce the new thing. Why do we consider the only case where target TCI state is not in the active TCI state list?

Qualcomm: we should only focus on FR2 HST.

Nokia: In HST we have non-collocated TCI state. The RRH is far away from each other. For legacy requirement, which legacy requirement will be applied. To Qualcomm, our proposal is to apply to PC6 UE. To Huawei, we have defined the requirement when target TCI state is active state. UE can track and keep timing.

ZTE: to option 2, we do not think option 2 is reflected in the spec totally.

Samsung: to ZTE, in the requirement, we say if the timing error shall be less than or equal to Te if the TCI is within the list. What is the difference. To Nokia, I still understand what the intention is here. It seems conflict with the proposal for the previous issue.

Qualcom: we can work on CR for option 1. For option 2 we agree with Samsung. Our spec has already covered all the collocated and non-collocated cases.

Nokia: to Samsung, we want to introduce the general requriements to cover all the possible cases when TRS procedure and larg uplink timing adjustment procedure is used.

Huawei: we also have question on the target TCI state in the active TCI state list. There is Tnew and also have Told. For Tnew and Told, both has Te. Then we have 2Te = 7Ts.

**Issue 1-2-2: UL timing requirement when large one-step mechanism is disabled**

* **Background**

Chairman notes from RAN4#102-e [RP-220925]:

|  |
| --- |
| Agreement:   * The conditions when one shot large UL timing adjustment requirements apply are FFS * Requirements for the case when [*largeOneStepUL-timingFR2-r17*] is not enabled need to be defined and are FFS. It is not precluded to reuse legacy requirements. |

At RAN4#103-e, the discussion continued, and the following agreement and WF were achieved [R4-2210608]:

|  |
| --- |
| **Issue 1-3-1: Requirements for the case when highSpeedLargeOneStepUL-TimingFR2-r17 is disabled**  **Agreement**:  No need to introduce new UL timing requirements for the case when highSpeedLargeOneStepUL-TimingFR2-r17 is disabled.  **Issue 1-3-2: Scheduling/Transmit restriction after TCI state switch**  **Way Forward**:  Further discussion is needed whether and how to define transmit or scheduling restriction for UL after the TCI state switch when highSpeedLargeOneStepUL-TimingFR2-r17 is disabled.   * Option 2: No impact on UE behavior * Option 3: Define scheduling restriction on DL and UL after inter-RRH TCI state switch and before PRACH transmission when highSpeedLargeOneStepUL-TimingFR2-r17 is disabled * Option 4: after the TCI state switch, the UE shall not transmit except for RACH preamble in the new target TCI before one of the following conditions is fulfilled:   - the new timing advance is acquired and applied in the target TCI state according to the requirements in clause 7.3;  - the UL transmission is scheduled by the gNB.  In this case, the requirements in clause 7.1.2.1 apply.   * Other options are not precluded |

* **Proposals and/or Observations**
  + Observation 1-1 (QC): The transmission restriction or any other requirement imposed before RACH can’t eliminate the interference across UEs on UL since the UL transmission after RACH has a misaligned frame boundary with the UL transmission from UEs in the old TCI state. Moreover, DL signals from different RRHs also arrived with misaligned frame boundaries due to propagation delay difference.
  + Observation 1-2 (QC): Since UL gradual timing adjustment is still applicable to UE, before RACH procedure and 200ms after TCI state switch, UE still follow the previous TCI state timing up to Tq autonomous adjustment, which is much smaller than CP and frame boundary misalignment has negligible impact to the UEs on the previous TCI state, at least much smaller than UE Tx after RACH.
  + Observation 2 (QC): We can eliminate cross UE interference on UL only when all UEs are transmitting on the same timing regardless of TCI state, otherwise UL transmission from UEs with different TCI states from different RRHs have misaligned frame boundaries.
  + **Proposal 1** (QC): Network applies different offsets to DL frame boundaries of different RRHs to pre-compensate the propagation delay difference across different RRHs to eliminate UL and DL interference across UEs when UEs in the same region are on different TCI states from different RRHs. Network doesn’t schedule UL transmission if network can’t handle different UL reception timing on different RRHs. After all the UEs are on the TCI states from the same RRH in the same region, network schedules RACH session to all UEs to acquire new UL and (uncompensated) DL timing.
  + **Proposal 2** (QC): If proposal 1 is too complicated for network implementation, given that transmission restriction can not eliminate UL interference across different TCI states, no additional requirement should be defined.
  + **Proposal 3** (CATT): When highSpeedLargeOneStepUL-TimingFR2-r17 is disabled, after the TCI state switch, option 4 is acceptable.
  + Observation 3 (Samsung): There are different ways in practice to perform RA-based UL timing adjustment, by considering PDCCH-order (for RA triggering) is sent from the source RRH or target RRH.
  + Observation 4 (Samsung): The issue of UE transmission in the new TCI state after TCI state switching but before the new TA is acquired cause more negative influence for the case in which PDCCH-order is sent from new TCI after TCI switching.
  + **Proposal 4** (Samsung): No need to transmit or scheduling restriction for UL after the TCI state switch, when highSpeedLargeOneStepUL-TimingFR2-r17 is disabled.
  + **Proposal 5** (Ericsson): Support Option2, no impact on UE behavior after TCI state switch.
  + **Proposal 6** (ZTE): Compared with Option 1 and Option 3, Option 4 is more feasible. However Option 4 is somehow radical since no matter inter-RRH TCI state or intra-RRH TCI state switch occurs, the transmit restriction is always applied.
* **Candidate options:**
  + Option 2 [Ericsson, QC, Samsung]: No impact on UE behavior (no additional requirements)
  + Option 3: Define scheduling restriction on DL and UL after inter-RRH TCI state switch and before PRACH transmission when highSpeedLargeOneStepUL-TimingFR2-r17 is disabled
  + Option 4 [CATT, ZTE]: After the TCI state switch, the UE shall not transmit except for RACH preamble in the new target TCI before one of the following conditions is fulfilled:
    - the new timing advance is acquired and applied in the target TCI state according to the requirements in clause 7.3;
    - the UL transmission is scheduled by the gNB.  
      In this case, the requirements in clause 7.1.2.1 apply.
  + Option 5 [QC]: Network applies different offsets to DL frame boundaries of different RRHs to pre-compensate the propagation delay difference to eliminate UL and DL interference.
* **Recommended WF**
  + Companies are invited to discuss the candidate options in the 1st round.

**Issue 2-2: SMTC in HST FR2 enhanced requirements**

* **Background**

This issue was actively discussed at the RAN4#103-e, and the following WF was achieved [R4-2210608]

**GtW Agreement:**

Option 1 agreed as starting point and further work on the drafting CR revision including table heading and note 3.

**Way forward:**

Further discussion is needed on how to define HST FR2 requirements if SMTC periodicity is > 40 ms.

* Option 1: Apply the FR2 HST enhanced requirement only when SMTC <=40ms cases. When SMTC period > 40ms, requirements in Table 9.2.5.2-2 apply.
* Option 2: Delete NOTE 3, keep table titles without changes and set M2 = 1.5
* Other options are not precluded

In the discussions, NOTE 3 was defined in the following way: When SMTC period > 40ms, requirements in Table 9.2.5.2-2 apply

For reference, the subtract from the latest version of TS 38.133 is presented below:

For UE supporting power class 6 with *highSpeedMeasFlagFR2-r17* configured, if SMTC <= 40ms, TPSS/SSS\_sync\_intra is given in Table 9.2.5.1-11; [otherwise, TPSS/SSS\_sync\_intra is given in Table 9.2.5.1-2.]

**Table 9.2.5.1-2: Time period for PSS/SSS detection, (Frequency range FR2)**

|  |  |
| --- | --- |
| **DRX cycle** | **TPSS/SSS\_sync\_intra** |
| No DRX | max(600ms, ceil(Mpss/sss\_sync\_w/o\_gaps x Kp x Klayer1\_measurement)x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(600ms, ceil(1.5 x Mpss/sss\_sync\_w/o\_gaps x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil(Mpss/sss\_sync\_w/o\_gaps x Kp x Klayer1\_measurement) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified | |

**Table 9.2.5.1-11: Time period for PSS/SSS detection when [*highSpeedMeasFlagFR2-r17*] is configured, (Frequency range FR2) when SMTC period <= 40ms**

|  |  |
| --- | --- |
| **DRX cycle** | **TPSS/SSS\_sync\_intra** |
| No DRX | max(600ms, ceil(M1Note 2 x Kp x Klayer1\_measurement)x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 80ms | max(600ms, ceil(M1Note 2 x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle)) x CSSFintra |
| 80ms< DRX cycle≤ 320ms | ceil(1.5x Mpss/sss\_sync\_w/o\_gaps Note 3 x Kp x Klayer1\_measurement)x max(SMTC period,DRX cycle) x CSSFintra |
| DRX cycle>320ms | ceil(Mpss/sss\_sync\_w/o\_gaps Note 3 x Kp x Klayer1\_measurement) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified  NOTE 2: For UE supporting power class 6, M1= 6 if [*highSpeedMeasFlagFR2-r17* = set1] or M1= 18 if [*highSpeedMeasFlagFR2-r17* = set2]  NOTE 3: Mpss/sss\_sync\_w/o\_gaps =24. | |

* **Proposals and/or Observations**
  + Proposal 1 (Samsung): For SMTC limit in HST FR2 enhancement requirements, to adopt the below Option 1, i.e.,
    - Option 1: Apply the FR2 HST enhanced requirement only when SMTC <=40ms cases. When SMTC period > 40ms, requirements in Table 9.2.5.2-2 apply.
  + Proposal 2 (CATT): support option 1: Apply the FR2 HST enhanced requirement only when SMTC <=40ms cases. When SMTC period > 40ms, requirements in Table 9.2.5.2-2 apply. The same principle is applied in intra-frequency measurement with measurement gaps.
  + Proposal 3 (ZTE): We prefer to respect the previous agreement. So Option 1 is recommended.
  + Observation 1 (Nokia): Legacy requirements for PSS/SSS detection and measurement delays apply to FR2 HST when SMTC periodicity > 40 ms.
  + Observation 2 (Nokia): When the legacy requirements for PSS/SSS detection and measurement delays apply to FR2 HST UE travelling at the maximum speed 350 km/h, complete mobility failures occur as shown by the simulation results.
  + Proposal 4 (Nokia): For UE supporting power class 6 with highSpeedMeasFlagFR2-r17 configured, if SMTC <= 40ms, TPSS/SSS\_sync\_intra is given in Table 9.2.5.1-11; [otherwise, TPSS/SSS\_sync\_intra is given in Table 9.2.5.1-2.]
    - Note: Operation with TPSS/SSS\_sync\_intra in Table 9.2.5.1-2 may not be guaranteed for the maximum speed under high-speed deployment scenarios considered in this release.
  + Proposal 5 (Nokia): For UE supporting power class 6 with highSpeedMeasFlagFR2-r17 configured, if SMTC <= 40ms, TSSB\_measurement\_period\_intra is given in Table 9.2.5.2-7; [otherwise, T SSB\_measurement\_period\_intra is given in Table 9.2.5.2-2.]
    - Note: Operation with T SSB\_measurement\_period\_intra in Table 9.2.5.2-2 may not be guaranteed for the maximum speed under high-speed deployment scenarios considered in this release.
* **Candidate options:**
  + Option 1 [Samsung, CATT, ZTE]: Apply the FR2 HST enhanced requirement only when SMTC <=40ms cases. When SMTC period > 40ms, requirements in Table 9.2.5.2-2 apply.
  + Option 2 [Nokia]: Add a clarification Note in Clause 9.2.5.1:  
    Operation with TPSS/SSS\_sync\_intra in Table 9.2.5.1-2 (TSSB\_measurement\_period\_intra in Table 9.2.5.2-2) may not be guaranteed for the maximum speed under high-speed deployment scenarios considered in this release.
* **Recommended WF**
  + Based on the online and offline discussions at RAN4#103-e it is Moderator’s understanding that even though the companies would like to have more flexibility in the configuration, there is not intent to use legacy requirements in the HST FR2 scenario.  
    Can Option 2 be agreeable?

**Discussions:**

**Agreement:**

**Issue 2-3: Mpss/sss\_sync\_w/o\_gaps and Mmeas\_period\_w/o\_gaps for power class 6 UEs**

* **Background**

The requirements on intrafrequency measurement without measurement gaps are defined in Caluse 9.2.5 of TS 38.133:

Mpss/sss\_sync\_w/o\_gaps : For a UE supporting FR2 power class 1 or 5, Mpss/sss\_sync\_w/o\_gaps =40. For a UE supporting power class 2, Mpss/sss\_sync\_w/o\_gaps =24. For a UE supporting FR2 power class 3, Mpss/sss\_sync\_w/o\_gaps =24. For a UE supporting FR2 power class 4, Mpss/sss\_sync\_w/o\_gaps =24

Mmeas\_period\_w/o\_gaps : For a UE supporting power class 1 or 5, Mmeas\_period\_w/o\_gaps =40. For a UE supporting FR2 power class 2, Mmeas\_period\_w/o\_gaps =24. For a UE supporting power class 3, Mmeas\_period\_w/o\_gaps =24. For a UE supporting power class 4, Mmeas\_period\_w/o\_gaps =24.

However, power class 6 UEs are not present in the requirements above.

Note, that Mpss/sss\_sync\_w/o\_gaps and Mmeas\_period\_w/o\_gaps are not used for the enhanced requirements when DRX cycle <= 80 ms.

* **Proposals and/or Observations**
  + Proposal 1 (CATT): In Table 9.2.5.1-11 & Table 9.2.5.2-7, use Mpss/sss\_sync\_w/o\_gaps and Mmeas\_period\_w/o\_gaps as 24 for power class 6 when DRX cycle > 80ms. The same principle is applied in intra-frequency measurement with measurement gaps.
* **Recommended WF**
  + Companies are welcomed to discuss whether Proposal 1 is agreeable.
  + If Proposal is agreeable, then shall “NOTE 3: Mpss/sss\_sync\_w/o\_gaps =24” be needed in HST FR2 enhanced tables?

**Discussions:**

**Agreement:**

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**[104-e][207] NR\_HST\_FR2\_RRM\_2, AI 9.7.3 – He(Jackson) Wang**

**R4-2214127 Email Discussion Summary for** **[104-e][207] NR\_HST\_FR2\_RRM\_2**

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

**Abstract:**

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

**Decision: Revised to R4-2214259**

**R4-2214259 Email Discussion Summary for [104-e][207] NR\_HST\_FR2\_RRM\_2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214470 | WF on RRM performance requirement for FR2 HST | Samsung | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
|  |  | Draft CR on test case for cell re-selection in HST FR2 | CATT | Merged, | Merged to the revision of R4-2212977 |
|  |  | Draft CR on test case for MAC-CE based TCI state switch Delay requirement in HST FR2 | CATT | Merged | Merged to the revision of R4-2212472 |
| R4-2211680 |  | Draft CR on test case for L3 measurement in HST FR2 | CATT | Merged | Merged to the revision of R4-2213385 |
| R4-2211681 |  | Draft CR on test case for L1-RSRP measurement requirement in HST FR2 | CATT | Merged | Merged to the revision of R4-2213883 |
| R4-2212472 | R4-2214964 | Draft CR to 38.133 on test case for MAC-CE based active TCI state switch for FR2 PC6 UE | Samsung | Agreeable | Revised to address open issues, and potentially capture test for one-shot timing adjustment requirement |
| R4-2212977 | R4-2214987 | Test case for Cell Re-selection Requirement for FR2 HST | Huawei | Agreeable |  |
| R4-2213385 | R4-2215050 | Test cases on Intra-frequency Measurements for HST FR2 | Ericsson | Agreeable |  |
| R4-2213883 | R4-2215096 | Test cases on Intra-frequency Measurements for HST FR2 | ZTE | Agreeable |  |
| R4-2213894 |  | L1 and L3 simulation results alignment | Nokia | Noted |  |
| R4-2213897 | R4-2215098 R4-2215157 | CR to TS 38.133: Test cases for gradual timing adjustment, one shot large UL timing adjustment and MAC-CE based TCI state switch for FR2 NR HST | Nokia | Agreeable | Only focus on gradual timing adjustment part |

**GTW on Aug-17**

**Sub-topic 1-2: RRM performance Scope**

* [Background] Based on the analysed during RAN4 103-e, the necessity of several TCs is still under discussion.

**Issue 1-2-1: Necessity of Test Cases for Re-establishment Delay Requirement**

**Channel model**

* **Proposals:**
  + Option 1 (Ericsson, Qualcomm): Apply bi-directional deployment channel model, AWGN with 19444Hz frequency offset
  + Option 1 (Samsung): Apply unidirectional deployment channel model, AWGN with 9722Hz frequency offset

**DRX cycle**

* **Proposals:**
  + Option 1 (Qualcomm): non-DRX

**TC**

* **Proposals:**
  + Option 1 (Samsung, Qualcomm): TCs for Re-establishment Delay Requirement can be skipped
  + Option 2 (CATT): Need new test case
    - Option 1-1 (CATT) :
      * Need new TC for Intra-frequency RRC Re-establishment in FR2 for PC6 UE configured with *highSpeedMeasFlagFR2-r17*
* **Recommended WF:**
  + Initial discussion provided in the 1st round discussion, on confirm/disconfirm the necessity of this test case.

**Issue 1-2-2: Necessity of Test Cases for gradual timing adjustment**

* **Proposals:**
  + Option 1 (Samsung, CATT, Nokia, Nokia Shanghai Bell): Need new test case (similar as A.7.4.1.1)
    - Option 1-2 (CATT):
      * If FR2 PC6 UE is really to test, define new test case similar as A.7.4.1.1
    - Option 1-3 (Nokia, Nokia Shanghai Bell) :
      * A new TC for the gradual timing adjustment with the adjustment value equals 10\*64\*Tc with DRX off
  + Option 2 (Samsung, Ericsson): Applying PC6 UE new requirement into A.7.4.1.1, and no need to define new test case
  + Option 3 (CATT, QC): No new test case needed
  + Option 4 (QC): introduce a base station test to ensure proper network operation
* **Recommended WF:**
  + Initial discussion provided in the 1st round discussion, on confirm/disconfirm the necessity of this test case.

**Discussions:**

Qualcomm: support option 2. Our understanding is option 2 and 3 are the same.

Ericsson: support comment from Qualcomm and Samsung. Regarding option 4, it does not belong to test case.

Nokia: we have comment for option2. How can Option 2 work? For HST, there is new requirement.

Qualcomm: we have all the test. The original test A 7.4.1.1 does not inclue PC6. But not applicability needs be added.

**Agreement:**

* Applying PC6 UE new requirement into A.7.4.1.1, and no need to define new test case

**Issue 1-2-3: Necessity of TC for one shot large UL timing adjustment for FR2 PC6 UE**

* **Proposals on necessity of TC:**
  + Option 1 (Samsung, CATT, Nokia): New test defined in clause A.7.4.1, similar as A.7.4.1.1
  + Option 1-1 (Samsung):
    - New TC shall be introduced to verify (1) the condition to apply one shot large UL timing adjustment, and (2) new transmit timing behavior and accuracy for one shot large UL timing adjustment
  + Option 2: (Qualcomm, Ericsson, Nokia, Nokia Shanghai Bell): One shot large UL timing adjustment test is combined into MAC-CE based TCI switch delay test
* **Proposals of others:**
  + Proposal (Nokia): For the one shot large UL timing adjustment,
    - (a) It is sufficient to perform one test assuming the unidirectional scenario;
    - (b) Set the one-way differential delay
* **Recommended WF:**
  + Initial discussion provided in the 1st round discussion, on confirm/disconfirm the necessity of this test case.

**Sub-topic 1-1: General Configuration and Applicability**

**Issue 1-1-1: Applicability of Set-1 and Set-2 of enhanced RRM requirements**

* [Background] The approved WF on the applicability of Set-1 and Set-2 of enhanced RRM requirements is summarized as follows, the TC category with “TBD” in the column of “applicability of set1 and set2” is needed to be defined

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| ***<WF>****:*   * Applicability of Set-1 and Set-2 of enhanced RRM requirements:  |  |  | | --- | --- | | TC category  (if confirmed in Sub-Topic 1) | Applicability of set1 and set2 (either set1 with 2RX beams or set2 with 6RX beams, or both) | | TC for Cell Re-selection Requirement | TBD | | TC for Re-establishment Delay Requirement | TBD | | TC for Timing Related Requirement | N/A (not differentiated by set1 and set2) | | TC for MAC-CE based TCI State Switch Delay Requirement | TBD (for target TCI is unknown, SSB-based TCI switching to a RS with new QCL-TypeD reference) | | TC for L3 measurement | TBD | | TC for L1-RSRP/SINR Measurement Requirement | TBD | |

* **Proposals:**
  + Option 1 (Samsung, Qualcomm, Ericsson): Different sets for different TCs
    - Option 1-1 (Samsung): Use NW RRC configuration *highSpeedMeasFlagFR2-r17 = set1 or set2* as TC condition
    - Option 1-2 (Ericsson): Adopting set2 in L3 relevant tests and adopting set1 in L1 relevant tests

**The details from Samsung and Qualcomm proposals:**

* **For MAC-CE based TCI state switching delay TC:**
  + Option 1-a (Samsung):
    - Set 1 only
  + Option 1-b (Qualcomm):
    - No need to decide
* **For Re-establishment Delay Requirement TC :**
  + Option 1-a (Samsung):
    - Set 2 only (if TC for re-establishment delay confirmed)
* **For L1-RSRP/SINR measurement Requirement TC:**
  + Option 1-a (Samsung):
    - Set1 for L1-RSRP measurement and Set2 for L1-SINR measurement (if TC for L1-SINR measurement confirmed)
  + Option 1-b (Qualcomm):
    - Choose a different set than L3 measurement (e.g., set 2)
* **For Cell Re-selection Requirement TC:**
  + Option 1-a (Samsung):
    - Set1 only
  + Option 1-b (Qualcomm):
    - Choose between set 1 and 2
* **For L3 measurement TC:**
  + Option 1-a (Samsung):
    - Set2 only
  + Option 1-b (Qualcomm):
    - Choose a different set than L1-RSRP (e.g., set 1)
* Recommended WF:
  + Initial discussion provided in the 1st round discussion, on confirm/disconfirm the necessity of this test case.

**Sub-topic 1-4: Measurement accuracy for FR2 HST UE**

**Issue 1-4-1: L1-measurement simulation result and alignment**

* Proposals:
  + Option 1 (Samsung, Ericsson): The legacy accuracy of L1-RSRP, LI-SINR in Rel-16 can be reused for L1 measurement in FR2 HST.
  + Option 2 (Qualcomm): The legacy accuracy of L1-RSRP can be reused, but Legacy L1-SINR need satisfy SNR < 5dB if reused
  + Option 3 (Nokia, Nokia Shanghai Bell): L1 measurement simulation is provided

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***<LI-SINR measurement accuracy>***  Table 11: Absolute L1-SINR measurement accuracy for AWGN with 19444 Hz frequency offset (frequency tracking disabled)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | CMR | IMR | 5th percentile (dB) | 50th percentile (dB) | 95th percentile (dB) | | CSI-RS | N/A | -1.47 | 0.13 | 1.55 | | SSB | NZP-IMR | -1.74 | -0.13 | 1.38 | | CSI-IM | -1.71 | -0.1 | 1.3 | | CSI-RS | NZP-IMR | -1.53 | -0.01 | 1.32 | | CSI-IM | -1.32 | -0.02 | 1.14 |   Table 12: Absolute L1-SINR measurement accuracy for AWGN with 19444 Hz frequency offset (frequency tracking enabled for bidirectional scenarios)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | CMR | IMR | 5th percentile (dB) | 50th percentile (dB) | 95th percentile (dB) | | CSI-RS | N/A | -0.82 | 0.64 | 1.94 | | SSB | NZP-IMR | -1.06 | 0.53 | 2.07 | | CSI-IM | -1.07 | 0.47 | 1.98 | | CSI-RS | NZP-IMR | -0.88 | 0.53 | 1.91 | | CSI-IM | -0.77 | 0.48 | 1.61 |   Table 13: Absolute L1-SINR measurement accuracy for AWGN with 0 Hz frequency offset   |  |  |  |  |  | | --- | --- | --- | --- | --- | | CMR | IMR | 5th percentile (dB) | 50th percentile (dB) | 95th percentile (dB) | | CSI-RS | N/A | -0.41 | 0.37 | 1.29 | | SSB | NZP-IMR | -1.04 | 0.45 | 1.75 | | CSI-IM | -1.1 | 0.44 | 1.78 | | CSI-RS | NZP-IMR | -0.81 | 0.57 | 1.88 | | CSI-IM | -0.7 | 0.58 | 1.71 | |
| ***<*** ***L1-RSRP measurement accuracy >***  Table 15: Absolute L1-RSRP measurement accuracy for AWGN with 19444 Hz frequency offset (frequency tracking disabled)   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | CMR | IMR | SINR | 5th percentile (dB) | 50th percentile (dB) | 95th percentile (dB) | | CSI-RS | N/A | -3 dB | -1.17 | 0.14 | 1.24 | | SSB | N/A | -3 dB | -1.54 | 0.04 | 1.44 |     Table 16: Absolute L1-RSRP measurement accuracy for AWGN with 19444 Hz frequency offset (frequency tracking enabled)   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | CMR | IMR | SINR | 5th percentile (dB) | 50th percentile (dB) | 95th percentile (dB) | | CSI-RS | N/A | -3 dB | -0.7 | 0.48 | 1.53 | | SSB | N/A | -3 dB | -0.98 | 0.42 | 1.73 |   Table 17: Absolute L1-RSRP measurement accuracy for AWGN with 0 Hz frequency offset   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | CMR | IMR | SINR | 5th percentile (dB) | 50th percentile (dB) | 95th percentile (dB) | | CSI-RS | N/A | -3 dB | -0.63 | 0.54 | 1.55 | | SSB | N/A | -3 dB | -1.11 | 0.43 | 1.64 | |

* Recommended WF:
  + Initial discussion provided in the 1st round discussion, on confirm/disconfirm the necessity of this test case.

**Issue 1-4-2: L3-measurement simulation result and alignment**

*Moderator’s Note: Whether SS-SINR can be reused or not is not mentioned in paper R4-2213340*

* **Proposals:**
  + Option 1 (Samsung, Ericsson): All the legacy accuracy in Rel-15/Rel-16 including SS-RSRP, SS-RSRQ, SS-SINR can be reused
  + Option 2 (Nokia, Nokia Shanghai Bell): All the legacy accuracy except SS-SINR can be reused

**The details from Nokia, Nokia Shanghai Bell’s option:**

* Option 2 (Nokia, Nokia Shanghai Bell): Whether SS-SINR can be reused or not depend on deployment scenarios
  + For Rel-17 FR2 HST unidirectional scenarios, the Rel-15 FR2 SS-SINR accuracy requirements can be reused.
  + For Rel-17 FR2 HST bidirectional scenarios, the Rel-15 FR2 SS-SINR accuracy requirements can be limited to SNR ≤ 10 dB
* Recommended WF
  + Initial discussion provided in the 1st round discussion, and companies’ view are collected.

**GTW on Aug-25**

**Issue 1-3-3: Test Cases for MAC-CE based TCI State Switch Delay Requirement**

1. **Channel model**

* Proposals:
  + Option 1 (Samsung, Nokia, Nokia Shanghai Bell): Apply bi-directional deployment channel model, AWGN with 19444Hz frequency offset
  + Option 2 (Qualcomm): Uni-directional and bi-directional deployment is not relevant as long as the timing difference is set properly as proposed: Timing offset between SSB 0 and SSB 1 is 2.33us
  + Option 3 (CATT, Ericsson): Apply unidirectional deployment channel model, AWGN with 9722Hz frequency offset

1. **DRX cycle**

* Proposals:
  + Option 1 (Qualcomm, Ericsson): 40 ms

1. **Timing offset**

* Proposals:
  + Option 1 (Qualcomm): Reuse A.7.5.8 test but need modify the Timing offset between SSB 0 and SSB 1, and the requirement of reception on TCI state 1

**Discussions:**

Nokia: regarding timing offset, we can accept 2.33us. we added one centence to the TP. Please check.

Qualcomm: set 2 is technically correct. Our first preference is set 1. One AOA seems better reflecting the scenario. For set 2 you need to determine the direction of one of the AOAs. How do you decide on the AOA to reflect the scenario correctly?

Samsung: it is BAU, we have to guarantee the directions satisfying the EIS spherical coverage. The directions will be selected from the spherical coverage tests. Here we just follow the ordinary NR AOA setup for the HST UE.

Nokia: we don’t have a strong view. To further understand how does one select the direction.

Qualcomm: our preference is set 1. We can compromise.

R&S: channel model will be independently applied to each of the AOA-s.

Samsung: it is the same setup as the existing TCI state switch test cases.

**Agreement:**

1. **AOA**

Configuration set2 with 2-AOA setup is applied for this test case.

### 9.8 Further RRM enhancement for NR and MR-DC

#### 9.8.3 Moderator summary and conclusions

**[104-e][208] NR\_RRM\_enh2\_1, AI 9.8.1, 9.8.1.1 and 9.8.2.1 – Jerry Cui**

**R4-2214128 Email Discussion Summary for [104-e][208] NR\_RRM\_enh2\_1**

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

**Abstract:**

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

**Decision: Revised to R4-2214260**

**R4-2214260 Email Discussion Summary for [104-e][208] NR\_RRM\_enh2\_1**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214328 | WF on R17 FeRRM - SRS antenna port switching | Apple | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2212032](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212032.zip) |  | draft CR on TC6 for NR FR1-E-UTRAN interruptions at NR SRS antenna port switching | OPPO | Not Pursued |  |
| [R4-2212122](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212122.zip) | R4-2214682 | DraftCR to TS 38.133: NR FR1 interruptions at NR SRS antenna port switching with more than 1 SRS symbol in NR-CA | Intel Corporation | Agreeable |  |
| [R4-2212266](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212266.zip) |  | 38133 CR on interruptions at SRS antenna port switching | Nokia, Nokia Shanghai Bell | Merged | Merged to the revised CR of R4-2212268 |
| R4-2212268 | R4-2214516 | 38133 CR on interruptions at SRS antenna port switching in MR-DC | Nokia, Nokia Shanghai Bell | Agreeable | CR R4-2212266 is merged to this revised CR |
| [R4-2212270](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212270.zip) | R4-2214690 | draftCR on TC1 on SRS antenna switching in EN-DC | Nokia, Nokia Shanghai Bell | Agreeable |  |
| [R4-2212659](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212659.zip) | R4-2214696 | Draft CR on test case for NR FR1 interruptions at NR SRS antenna port switching with 1 SRS symbol in NR-CA | vivo | Agreeable |  |
| R4-2212948 |  | CR on SRS antenna port switching requirements 36.133 | Huawei, HiSilicon | Agreeable |  |
| [R4-2212952](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212952.zip) | R4-2214708 | Draft CR on TC for NR SRS antenna port switching with more than 1 SRS symbol in asynchronous EN-DC | Huawei, HiSilicon | Agreeable |  |

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**GTW on Aug-22**

**Topic #3: SRS antenna port switching performance part**

**Issue 3-1-1: General configuration – SCS and BW**

Agreements in R4-2210996 (RAN4#103e):

* for configuration of test cases for SRS antenna port switching, to consider following cases:
  + 15 kHz SSB SCS with 10 MHz bandwidth for FDD
  + 15 kHz SSB SCS with 10 MHz bandwidth for TDD
  + 30 kHz SSB SCS with 40 MHz bandwidth for TDD
* Proposals
  + Option 1 (Huawei): above configurations applies for both aggressor cell and victim cell, and such configuration may be different between aggressor cell and victim cell. The configuration for different cells can be chosen independently in the test.
    - Option 1a (vivo): The test case configuration applies for both aggressor CC and victim CC, and such configuration may be different between aggressor cell and victim cell. It is preferred that aggressor can only be within TDD band.
  + Option 2 (Apple): above configurations applies for both aggressor cell and victim cell, and such configuration is same between aggressor and victim.
    - Option 2a (CATT): Same configuration for aggressor cell and victim cell should be prioritized if supported on these operating bands. If same configuration is not supported on the selected bands, different configurations between aggressor cell and victim cell can be used.
  + Option 3 (Nokia): The agreed configuration on SCS and BW applies to aggressor cell. For victim cell, only TDD mode with the same SCS and BW configuration is considered.

**Discussions:**

Apple: We can compromise to option 1. We d like to add the note that the UE is required to test only one of the combinations.

Vivo: we support option 1. For aggressor cell it is TDD band. So 1a is better.

Huawei: we support option 1. RAN5 demands that there is no restriction on the combination so that there is certain combbiantion without any TC. One approach is to state in the test requirements that the configurations of SCS and BW between victim and aggressor cells are chosen independently.

MediaTek: we are fine with option 1. Coverage is important so that test cases are close to deployments.

Nokia: one difference between 1 and 3 is that TDD+TDD and TDD+FDD are different. Maybe we need to decide the list of combos here.

Qualcomm: it is different between port and carrier switchings in terms of TDD band aggressors.

CATT: we can compromise to option 1. It is realistic.

Huawei: To Nokia, to specify the list for EN-DC cases, it is difficult to list all of the combos in the spec.

Vivo: to QC, SRS port switching is mainly operated under TDD cell. But we are ok to also specify FDD aggressor test cases.

**Agreement:**

* for configuration of test cases for SRS antenna port switching, to consider following cases:
  + 15 kHz SSB SCS with 10 MHz bandwidth for FDD
  + 15 kHz SSB SCS with 10 MHz bandwidth for TDD
  + 30 kHz SSB SCS with 40 MHz bandwidth for TDD
* Above configurations apply for both aggressor cell and victim cell, and such configuration may be different between aggressor cell and victim cell. The configuration of victim and aggresor cells can be chosen independently in the test.
* Add a note in the test requirements that the UE is required to test only one of the supported combinations.

**Issue 3-2-1: Special slot configuration to accommodate 6 SRS symbols**

* Proposals (Qualcomm): Since the start position is 5, we need 6 UL symbols in the special slot to accommodate SRS symbols, and the special slot configuration is below

|  |  |
| --- | --- |
| SCS | Special slot configuration |
| 15kHz | S = ‘6DL: 2GP: 6UL’ |
| 30kHz | S = ‘4DL: 4GP: 6UL’ |

**Discussions:**

Nokia: We wonder if this is also applied to scenario 1. We prefer to apply the existing config for S slot for scenario 1.

Qualcomm: we prefer to have the same S slot config for all the SRS port switching test cases. It simplifies the test setup. We have the similar situation as in the SRS carrier switching tests. They also demand 6UL.

Huawei: scenario 1 has also some problem with the legacy config for S slot.

**Agreement:**

For Scenario 2 in SRS antenna port switching test cases, new TDD configurations are introduced to have 6UL symbos in the special slot.

|  |  |
| --- | --- |
| SCS | Special slot configuration |
| 15kHz | S = ‘6DL: 2GP: 6UL’ |
| 30kHz | S = ‘4DL: 4GP: 6UL’ |

**Issue 3-1-2: SRS configuration for scenario 1 sync case (symbol-level interruption)**

Agreements in R4-2210996 (RAN4#103e):

* Counting missed ACK/NACK number (it’s a slot level interruption counting)
  + Option 1:
    - Define test cases for scenario 1 sync case by allocating the SRS resource at the last but one symbol of slot and the interruption on victim CCs should be no longer than 1 slot (subframe for E-UTRA) when the SCS of aggressor CC and victim CC is 15/30 KHz.
  + Option 2:
    - Define test cases for scenario 1 sync case by allocating the SRS resource before the last two symbols or more of slot and the interruption on victim CCs should be no longer than 1 slot (subframe for E-UTRA) when the SCS of aggressor CC and victim CC is 15/30 KHz.
* Proposals
  + Option 1 (CATT, vivo) : Define test cases for scenario 1 sync case by allocating the SRS resource at the last but one symbol of slot and the interruption on victim CCs should be no longer than 1 slot (subframe for E-UTRA) when the SCS of aggressor CC and victim CC is 15/30 KHz.
  + Option 2 (Apple, Nokia): Define test cases for scenario 1 sync case by allocating the SRS resource before the last two symbols or more of slot and the interruption on victim CCs should be no longer than 1 slot (subframe for E-UTRA) when the SCS of aggressor CC and victim CC is 15/30 KHz.
    - Option 2b (Huawei): Define test cases for scenario 1 sync case by allocating the SRS resource at the 10th symbol of a slot and the interruption on victim CCs should be no longer than 1 slot (subframe for E-UTRA) when the SCS of aggressor CC and victim CC is 15/30 KHz.

**Discussions:**

Nokia: it is reasonable to also apply 6UL for scenario 1.

CATT: the timing difference between the cells setups is not considered?

Qualcomm:

Apple: to CATT, for 15khz it maybe fine. But for 30khz, it is larger. Also for future proof, we may need to introduce larger timing differences for test setups.

CATT: currently MTTD is not considered.

Apple: we can set 3us.

Ericsson: we agree to 3us. The core spec already accommodates the MTTD.

Huawei: 1 or 2 symbols are added due to timing difference between victim and aggressor. So 10th symbol.

Qualcomm: 10th symbol makes sense. It aligns the configuration between scenario 1 and 2.

**Agreement:**

Define test cases for scenario 1 sync case by allocating the SRS resource before the last two symbols or more of slot i.e., at the 10th symbol of a slot and the interruption on victim CCs should be no longer than 1 slot (subframe for E-UTRA) when the SCS of aggressor CC and victim CC is 15/30 KHz.

For Scenario 1 in SRS antenna port switching test cases, new TDD configurations are introduced to have 6UL symbos in the special slot.

|  |  |
| --- | --- |
| SCS | Special slot configuration |
| 15kHz | S = ‘6DL: 2GP: 6UL’ |
| 30kHz | S = ‘4DL: 4GP: 6UL’ |

**Issue 3-2-2: test configurations of each SRS, scenario and xTyR in special slot**

* Proposal (Qualcomm): In order to have SRS antenna switching on special slots, we propose the following tables for test configurations of each SRS, scenario and xTyR:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 15kHz, scenario 1 | 1T2R | | 2T4R | | 1T4R | | | |
| srs-ResourceId | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 3 |
| startPosition | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| nrofSRS-Ports | port1 | port1 | port2 | port2 | port1 | port1 | port1 | port1 |
| periodicityAndOffset-p | sl40, 1 | sl40, 5 | sl40, 1 | sl40, 5 | sl40, 1 | sl40, 5 | sl40, 9 | sl40, 13 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 15kHz, scenario 2 | 1T2R | | 2T4R | | 1T4R | | | |
| srs-ResourceId | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 3 |
| startPosition | 5 | [2] | 5 | [2] | 5 | [2] | 5 | [2] |
| nrofSRS-Ports | port1 | port1 | port2 | port2 | port1 | port1 | port1 | port1 |
| periodicityAndOffset-p | sl40, 1 | sl40, 1 | sl40, 1 | sl40, 1 | sl40, 1 | sl40, 1 | sl40, 5 | sl40, 5 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 30kHz, scenario 1 | 1T2R | | 2T4R | | 1T4R | | | | |
| srs-ResourceId | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 3 |
| startPosition | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| nrofSRS-Ports | port1 | port1 | port2 | port2 | port1 | port1 | port1 | port1 |
| periodicityAndOffset-p | sl80, 3 | sl80, 11 | sl80, 3 | sl80, 11 | sl80, 3 | sl80, 11 | sl80, 19 | sl80, 27 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 30kHz, scenario 2 | 1T2R | | 2T4R | | 1T4R | | | |
| srs-ResourceId | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 3 |
| startPosition | 5 | [2] | 5 | [2] | 5 | [2] | 5 | [2] |
| nrofSRS-Ports | port1 | port1 | port2 | port2 | port1 | port1 | port1 | port1 |
| periodicityAndOffset-p | sl80, 3 | sl80, 3 | sl80, 3 | sl80, 3 | sl80, 3 | sl80, 3 | sl80, 11 | sl80, 11 |

**Discussions:**

Vivo: need further check on the highlighted numbers.

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**[104-e][209] NR\_RRM\_enh2\_2, AI 9.8.1.2 and 9.8.2.2 – Qian Yang**

**R4-2214129 Email Discussion Summary for [104-e][209] NR\_RRM\_enh2\_2**

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

**Abstract:**

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

**Decision: Revised to R4-2214261**

**R4-2214261 Email Discussion Summary for [104-e][209] NR\_RRM\_enh2\_2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214329 | WF on FR1+FR2 test cases for HO with PSCell | vivo | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211634 |  | Test case of handover with PSCell from EN-DC to EN-DC with known target PSCell in FR1 | CATT | Agreeable |  |
| R4-2211843 | R4-2214670 | Draft CR on TC for HO with PSCell from NR-SA to EN-DC with parallel processing and known FR2 PSCell in TS38.133 R17 | Apple | Agreeable |  |
| R4-2211956 | R4-2214509 | CR on test case for Handover with PSCell from NR SA to EN-DC with sequential processing | Xiaomi | Agreeable |  |
| R4-2212033 | R4-2214677 | draft CR on TC2 for HO with PSCell from NR SA to EN-DC with parallel processing | OPPO | Agreeable |  |
| R4-2212129 | R4-2214683 | DraftCR to TS 38.133: Handover with PSCell from NR-DC to NR-DC with sequential processing | Intel Corporation | Agreeable |  |
| R4-2212660 | R4-2214697 | draft CR on test cases for Handover with PSCell from NE-DC to NE-DC with known target PSCell | vivo | Agreeable |  |
| R4-2212860 | R4-2214698 | Correction on HO with PSCell test cases | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212953 | R4-2214709 | Draft CR on TC for HO with PSCell from NR SA to EN-DC | Huawei, HiSilicon | Agreeable |  |
| R4-2213948 | R4-2214526 | CR on correction of fine timing for HO with PSCell when PSCell is on CCA in EN-DC to EN-DC scenario | Ericsson | Agreeable |  |
| R4-2213949 | R4-2214527 | CR on correction of fine timing for HO with PSCell when PSCell is on CCA in NR SA to EN-DC scenario | Ericsson | Agreeable |  |
| R4-2213952 | R4-2214732 | TC for EN-DC to EN-DC Handover with PSCell using CCA with known target PSCell | Ericsson | Agreeable |  |
| R4-2213953 | R4-2214733 | TC for NR SA to EN-DC Handover with PSCell using CCA with known target PSCell | Ericsson | Agreeable |  |
| R4-2215108 |  | Draft CR on TC for HO with PSCell from EN-DC with FR1 PSCell to EN-DC with FR2 PSCell | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2215109 |  | Draft CR on TC for HO with PSCell from EN-DC with FR2 PSCell to EN-DC with FR2 PSCell | MediaTek Inc. | Withdrawn |  |

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**GTW on Aug-22**

**Topic #2: HO with PSCell test cases**

**Issue 2-1-1: Test cases design principle - FR1+FR2 test cases**

* Background agreements in R4-2115240:
* FR1/LTE+FR2 test has OTA testability problem if at least one of the following criteria is met:
  + Tests where any requirement is tested for FR1/LTE,
  + Tests where UE receives any DL message (e.g. RRC/DCI/MAC-CE configuration message/command etc) on FR1/LTE between the starting point and ending point of the test, and
  + Tests where UE transmits any UL signal (e.g. measurement report, ACK/NACK, CSI etc) b on FR1/LTE between the starting point and ending point of the test.
* Proposals
  + Option 1 (CATT, Apple, MTK): Test case design is delayed until testability issues are solved
  + Option 2 (Qualcomm): Introduce the test case in R17 and define applicability
* Recommended WF
  + Companies are encouraged to provide views on the two options for FR1+FR2 test cases design. Other options are not precluded in the 1st round.

**Discussions:**

Huawei: for HO with PSCell test cases, it is more complicated than PUCCH SCell tests. It is similar as the difficult ones for PUCCH SCell tests.

Apple: we should apply the same principle between HO and PUCCH SCell activation.

MTK: we prefer to have reduced number of test cases.

Qualcomm: we support the proposal. Parallel processing should be assumed from the Scenario perspective.

Intel: let’s consider only parallel processing in the test cases.

Apple: we can compromise to the proposal.

**Agreement:**

Specify test cases for HO with PSCell – the below FR1+FR2 test cases

* FR1+FR2 NR-DC to FR1+FR2 NR-DC
* FFS EN-DC with FR1 PSCell to EN-DC with FR2 PSCell
* FFS NR-SA FR1 to EN-DC with FR2 PSCell
* FFS EN-DC with FR2 PSCell to EN-DC with FR2 PSCell

Introduce the cases with applicability rule based on the testability study and update the applicability when testability study progress.

**Issue 2-1-2: Test cases list for FR1+FR2 test cases**

* Proposals
  + Option 1:
    - FR1+FR2 NR-DC to FR1+FR2 NR-DC
    - EN-DC with FR1 PSCell to EN-DC with FR2 PSCell
    - EN-DC with FR2 PSCell to EN-DC with FR1 PSCell
    - EN-DC with FR2 PSCell to EN-DC with FR2 PSCell
    - NR-SA FR2 to EN-DC with FR1 PSCell
    - NR-SA FR2 to EN-DC with FR2 PSCell
    - NR-SA FR1 to EN-DC with FR2 PSCell
  + Option 2:
    - FR1+FR2 NR-DC to FR1+FR2 NR-DC
    - EN-DC with FR1 PSCell to EN-DC with FR2 PSCell
    - NR-SA FR1 to EN-DC with FR2 PSCell

**Discussions:**

Nokia: we proposed Option 2. The approach to specify test cases and applicability rules should be applied. Option 2 is balanced coverage.

Huawei: Optino 2 are more difficult. However the scenarios are important as serving and target cells are in different FR.

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**[104-e][210] NR\_RRM\_enh2\_3, AI 9.8.1.3 and 9.8.2.3 – Qiuge Guo**

**R4-2214130 Email Discussion Summary for [104-e][210] NR\_RRM\_enh2\_3**

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

**Abstract:**

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

**Decision: Revised to R4-2214262**

**R4-2214262 Email Discussion Summary for [104-e][210] NR\_RRM\_enh2\_3**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214330 | WF on further RRM enhancement for NR and MR-DC - PUCCH SCell activation/deactivation requirements | CATT | Agreeable |
| R4-2214331 | draftCR on TC 1-7 PUCCH SCell activation and deactivation delay requirements of FR1 known PUCCH SCell and one FR1 unknown SCell | Xiaomi | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211631 | R4-2214506 | Completing PUCCH SCell activation requirement | CATT | Agreeable |  |
| [R4-2211635](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2211635.zip)  TC 1-6 | R4-2214663 | TC1-6 for PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with inter-band FR2 PCell | CATT | Agreeable |  |
| [R4-2211636](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2211636.zip)  TC 2-2 |  | TC2-2 for PUCCH SCell activation and deactivation delay requirements of FR1 unknown cell (All NR cells in FR1) | CATT | Noted |  |
| [R4-2211845](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2211845.zip)  TC 1-8 | R4-2214671 | Draft CR on TC for PUCCH SCell activation and deactivation delay requirements of FR1 unknown PUCCH SCell and one FR1 unknown SCell (All NR cells in FR1) | Apple | Agreeable |  |
| [R4-2211846](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2211846.zip)  TC 2-10 | R4-2214672 | Draft CR on TC for PUCCH SCell activation and deactivation delay requirements of FR2 unknown PUCCH SCell and one FR2 unknown SCell with FR2 PSCell | Apple | Agreeable |  |
| [R4-2212034](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2212034.zip)  TC 2-1 |  | draft CR on TC10 for PUCCH SCell activation and deactivation delay requirements of FR1 known cell for EN-DC | OPPO | Noted |  |
| [R4-2212183](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2212183.zip)  TC 1-4 and 1-10 | R4-2214688 | draft CR of TC 1-4 and 1-10 (FR2 unknown PUCCH SCell Activation) | Qualcomm | Agreeable |  |
| R4-2212267 |  | 38133CR on PUCCH SCell activation delay requirement - Resubmission | Nokia | Merged | Merged with R4-2212272 |
| R4-2212272 | R4-2214517 | 38133CR on PUCCH SCell activation delay | Nokia | Agreeable |  |
| [R4-2212273](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2212273.zip)  TC 1-5 and TC 2-6 | R4-2214691 | draftCR on TC1-5 and TC2-6 PUCCH SCell activation in FR2 inter-band | Nokia | Agreeable | To only capture TC 1-5 |
| [R4-2212519](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2212519.zip)  TC 1-2 | R4-2214694 | Draft CR on TC for PUCCH SCell activation and deactivation delay of FR1 unknown cell | MTK | Agreeable |  |
| [R4-2212520](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2212520.zip)  TC 2-9 | R4-2214695 | Draft CR on FR2 TC for PUCCH SCell activation and deactivation delay of known PUCCH SCell and one unknown SCell with PSCell | MTK | Agreeable |  |
| R4-2212950 |  | CR on interruption of PUCCH SCell activation | Huawei | Postponed | Based on issue 1-1-7 |
| [R4-2212955](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2212955.zip)  TC 1-1 and TC 2-3 | R4-2214710 | Draft CR on TC for PUCCH SCell activation and deactivation | Huawei | Agreeable |  |
| [R4-2213460](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2213460.zip)  TC 2-7 |  | draft CR for TC for PUCCH SCell activation and deactivation delay requirements of FR1 known PUCCH SCell and one FR1 unknown SCell | vivo | Noted |  |
| R4-2213951 |  | Maintenance CR on SCell activation/deactivation with PUCCH | Ericsson | Postponed | Based on issue 1-1-2 and 1-1-7 |
| [R4-2213954](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2213954.zip)  TC 1-3 | R4-2214734 | TC for PUCCH SCell activation and deactivation delay requirements of FR2 known cell with FR1 PCell | Ericsson | Agreeable |  |
| [R4-2213955](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2213955.zip)  TC 1-9 | R4-2214735 | TC for PUCCH SCell activation and deactivation delay requirements of FR2 known PUCCH SCell and one FR2 unknown SCell with FR2 PCell | Ericsson | Agreeable |  |
| [R4-2213956](file:///F:\3gpp文件\会议文稿\RAN4\WG4-104-e\Docs\R4-2213956.zip)  TC 2-8 |  | TC for PUCCH SCell activation and deactivation delay requirements of FR1 unknown PUCCH SCell and one FR1 unknown SCell (All NR cells in FR1) | Ericsson | Noted |  |

.

**GTW on Aug-22**

**Topic #2: PUCCH SCell activation/deactivation performance requirements**

**Issue 2-1-3: Whether to define test case for FR1 PCell/PSCell + FR2 PUCCH SCell**

Proposals

* Option 1: (Qualcomm, Huawei)
  + Yes
* Option 1a: (Huawei)
  + TE determines the starting point of the test based on the activation command of which the HARQ ACK is successfully received
* Option 1b: (Huawei)
  + For FR1 PCell/PSCell + FR2 PUCCH SCell, only consider known PUCCH SCell with valid TA
* Option 1c: (Qualcomm)
  + For FR1 PCell/PSCell + FR2 PUCCH SCell, if PUCCH SCell in unknown, don’t consider valid TA scenario.
* Option 1d: (Qualcomm)
  + RAN4 to define the test case of “FR1 PCell/PSCell + FR2 PUCCH SCell” in Rel-17 without adding another FR2 serving cell as a workaround
  + Include the test cases to Table A.3.13A.3-1(which indicates the test cases that UE don’t need to pass in current version) until the testability issue on FR1+FR2 is resolved.
* Option 2: (MTK, Apple, CATT)
  + Not to define the test case for FR1 + FR2 scenario.
* Recommended WF
  + *Need more discussion*
  + *Impacted TCs: TC 1-3, TC 1-4, TC 2-3, TC 2-4*
  + *If option 1b is agreed, TC 1-4 and TC 2-4 are not needed and no need to define invalid TA scenario in TC 1-3 and TC 2-3.*
  + *If option 1c is agreed, no need to define valid TA scenario in TC 1-4 and TC 2-4.*

**Discussions:**

Huawei: based on the TE vendor input, option 1a and 1b provide support on some of the test cases so that the requirements can be verified. We can compromise to that we don’t test cases other than known with valid TA.

Ericsson: we agree with Huawei. We can agree on general approaches to solve the problem for FR1+FR2 test cases further. Maybe we can first specify everything and further with applicability. And update the applicability according to testability study outcome.

Qualcomm: we prefer to specify the test cases based on the currently testability. We should define the test cases right now. We don’t rely on future work.

Nokia: we agree with Ericsson. At least we need to specify some of the test cases. We can further discuss for the difficult cases.

Apple: we can compromise to Huawei proposal. We can test based on the TE vendor input. But for the difficult cases, we need more check on intorudcing them with applicability.

Vivo: we support Huawei proposal on this PUCCH activation test cases. However regarding general approaches, we need further check on the difficult ones. The work load is also huge.

MediaTek: we can compromise to define some test cases.

Qualcomm: Most likely we will specify known cases. Real field cases are important. FR2 PUCCH scell unknown cases are field cases.

Huawei: Unknown and invalid TA cases make sense. But they are not doable at the moment. So we introduce applicability at the moment.

Ericsson: there is not huge work load. We also prefer to finish everything in the work item. Otherwise there is not a valid placeholder.

Qualcomm: we are fine with Huawei proposal. Unknown but valid TA does not exist.

Apple: repeat that for the difficult cases we have concern on introducing it.

**Agreement:**

Define test case for FR1 PCell/PSCell + FR2 PUCCH SCell

* TE determines the starting point of the test based on the activation command of which the HARQ ACK is successfully received
* For FR1 PCell/PSCell + FR2 PUCCH SCell, consider known PUCCH SCell with valid TA
* FFS
  + Introducing the unknown PUCCH SCell and invalid TA cases with applicability rule based on the testability study
  + Updating the applicability when testability study progress

**New Issue 2-1-4a: For PUCCH SCell activation with multiple DL SCells in FR2, whether to define test for the case when non-PUCCH SCell is in same PUCCH group as PCell, i.e. Primary PUCCH group**

Proposals

* Option 1:
  + Yes
* Option 2:
  + No

**Discussions:**

Qualcomm: the reason to add this is that it is valid case when non-PUCCH SCell is in the same PUCCH group as PCell.

Apple: two purely unknown SCells can be in the same band but different from PCell.

Ericsson: whether a normal SCell can send cross group CSI reporting to the PCell instead on the PUCCH scell?

Apple: when the non PUCCH SCell is in the same band with the PCell the report is on the PCell.

**Agreement:**

For PUCCH SCell activation with multiple DL SCells in FR2, define test for the case when non-PUCCH SCell is in the same PUCCH group as PCell, i.e. Primary PUCCH group.

**Topic #1: PUCCH SCell activation/deactivation core requirements maintenance**

**Issue 1-1-1: Whether the PL-RS will introduce extra delay time when the known condition is met in FR2 (the value of [X] in 8.3.12)?**

Proposals

* Option 1: (CATT, Apple, Huawei)
  + When PL-RS of target PUCCH SCell is known, the X=5 sample measurement time is always considered and no need to consider condition of ‘maintain’ or ‘not maintain’.
* Option 2: (Nokia)
  + PL-RS is considered as maintained if the UE has acquired intra-frequency L3 measurement on deactivated PUCCH SCell according to section 9.2.5.2.
  + If PUCCH SCell is known in FR2, the reported L3 measurement results can be reused for pathloss estimation and additional PL-RS measurement is not needed during PUCCH SCell activation.
  + If PUCCH SCell is unknown in FR2, additional PL-RS measurement delay is allowed only when the PL-RS is not maintained.
* Option 3: (MTK)
  + No requirement when the PL-RS has been maintained before UE receives activation command for PUCCH SCell.
  + For non-maintained PL-RS, additional five PL-RS measurement samples are needed.

**Discussions:**

**Agreement:**

**Issue 1-1-2: Update TFirst\_available\_CSI and TCSI\_reporting\_after in the PUCCH SCell activation delay requirements?**

Proposals

* Option 1: (Ericsson)
  + Existing requirements:
    - - TFirst\_available\_CSI: the delay uncertainty in acquiring the first available downlink CSI reference resource.
    - - TCSI\_reporting\_after: the delay uncertainty in acquiring the first available CSI reporting resource after T3
  + Update to:
    - - TLast\_Valid\_CSI: the delay uncertainty in acquiring the downlink CSI reference resource which is the last CSI reference resource before the first available CSI report resource after T1+T2+T3. Where time difference between last CSI reference resource before the first available CSI report resource after T1+T2+T3 and the first available CSI report resource after T1+T2+T3 is less than **Threshold1**. Where **Threshold1** is configurable parameter in CSI resource settings.
    - - TCSI\_reporting\_after is the delay uncertainty in acquiring the first available CSI reporting resource after T3 if time difference between first available CSI report resource after T3 and last available CSI reference resource before this CSI report resource is less than **Threshold1**. Where **Threshold1**is configurable parameter in CSI resource settings. Else, it is the delay uncertainty in acquiring the second available CSI report resource.

**Discussions:**

**Agreement:**

**Issue 1-1-7: Clarification on interruption length on UL transmission when colliding with PRACH transmission on PUCCH SCell?**

Proposals

* Option 1: (Huawei)
  + No need to define the interruption length of PRACH transmission when UE is not capable of *parallelTxPRACH-SRS-PUCCH-PUSCH­*.
* Option 2: (Ericsson)
  + RAN4 to define 4 different interruption groups with each group having different interruption length.
    - For preambles format A1, A2, A3, B1, B2, B3, B4, C0 and C1, the interruption length is 0.5ms.
    - For preambles format 0 and 3, the interruption length is 1ms.
    - For preambles format 1, the interruption length is 3ms.
    - For preambles format 2, the interruption length is 5ms.

**Discussions:**

**Agreement:**

### 9.9 NR and MR-DC measurement gap enhancements

#### 9.9.3 Moderator summary and conclusions

**[104-e][211] NR\_MG\_enh\_1, AI 9.9.1, 9.9.1.2 and 9.9.2.2 – Ato Yu**

**R4-2214131 Email Discussion Summary for [104-e][211] NR\_MG\_enh\_1**

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

**Abstract:**

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

**Decision: Revised to R4-2214263**

**R4-2214263 Email Discussion Summary for [104-e][211] NR\_MG\_enh\_1**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214332 | Test case for Con-MGs TC1 | Ericsson | Agreeable |
| R4-2214333  R4-2215158 | WF on R17 NR MG enhancements – multiple concurrent MGs | MediaTek inc. | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211896 | R4-2214675 | draftCR on concurrent gaps test case for FR2 SA with SSB and PRS | Apple | Agreeable |  |
| R4-2212031 | R4-2214510 | CR to enhanced gap configuration for RRM requirements applicability | OPPO | Postponed |  |
| R4-2212079 | R4-2214513 | Maintenance CR on TS38.133 for concurrent gaps core part | MediaTek inc. | Agreeable |  |
| R4-2212083 | R4-2214681 | CR on TS38.133 for concurrent MG test case No 2 | MediaTek inc. | Agreeable |  |
| R4-2212134 | R4-2214685 | [draftCR] CR for concurrent MG test case No 4 | Intel | Agreeable |  |
| R4-2212761 |  | Test case for Con-MGs TC1 | Ericsson | Not pursued |  |
| R4-2212872 | R4-2214518 | CR for concurrent measurement gaps | Nokia | Agreeable |  |
| R4-2212873 | R4-2215132 | LS on priority for legacy gaps | Nokia | Agreeable | To: RAN\_2 |
| R4-2212875 | R4-2214699 | DraftCR TC#3 on Concurrent Measurement Gaps | Nokia | Agreeable |  |
| R4-2213509 | R4-2214522 | CR on concurrent MG related requirements | Huawei | Agreeable |  |
| R4-2213515 | R4-2214724 | CR to introduce TC#5 for concurrent MGs | Huawei | Agreeable |  |
| R4-2213881 | R4-2214729 | Draft CR on test case for Concurrent MG for FR2 PPO in TS38.133 A.7.6.2.x | ZTE | Agreeable |  |

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**GTW on Aug-19**

**Topic #3: Performance requirement for concurrent gaps**

**Issue 3-1: Whether to introduce test cases for PRS measurement**

* Proposals
  + Option 1: Yes

**Discussions:**

Apple: we are fine with option 1. One note is that this applies to UE supporting PRS measurement.

Intel: we support option 1. Which PRS measurement needs to be defined? PRS RSRP or RSTD?

Apple: we prefer to have RSRP rather than RSTD. In the RSRP tests we have only two cells.

**Agreement:**

Confirm that RAN4 is to introduce test cases for PRS measurement with concurrent gaps.

PRS RSRP test cases will be introduced.

**Issue 3-2: Whether to introduce test cases for EUTRAN measurement**

* Proposals
  + Option 1: Yes

**Discussions:**

**Agreement:**

Confirm that RAN4 is to introduce the test case for EUTRAN measurement with concurrent gaps.

**Issue 3-3: Which test case to add for SBI reporting**

* Background: Agreement in last meeting
  + **< Agreement>** Define test case without SBI reporting. FFS whether and how to pick 1 test case for SBI reporting
* Proposals
  + Option 1: Yes: TC#1

**Discussions:**

Ericsson: we can skip the test. Is there particular reason that we introduce it?

Apple: we don’t see the importance in introducing it.

**Agreement:**

Skip SBI reporting test case for concurrent gaps.

**Topic #2: Core requirement maintenance for concurrent gaps**

**Issue 2-3: How to define the overhead cap when concurrent MGs are configured**

* Proposals
  + Option 1: Introduce UE capability to indicate whether configuration restriction apply
    - Option 1a: Apple, Xiaomi, Nokia
      * The MGRP for each MG cannot be smaller than 40ms
    - Option 1b: Apple
      * Up to one MGP can be configured with MGRP=20ms
    - Option 1c: Qualcomm
      * A set of candidate values of per FR maximum overhead includes {30%, 40%, 50%}
  + Option 2: Directly add NW configuration limitation in spec
    - Option 2a: CMCC
      * The MGRP for each MG cannot be smaller than 40ms simultaneously
    - Option 2b: MTK, Huawei, CMCC
      * Up to one MGP can be configured with MGRP=20ms
    - [Option 2c]:
      * Both MGRP are larger than 20ms
  + Option 3: Extending dropping rules
    - Option 3a: Intel, E///
      * when two MGs configuring with MGRP=20ms, the lower priority gap can be cancelled regardless of proximity rule and data scheduling is resumed on the dropped gap occasions
  + Option 4: Qualcomm
    - Signal the preferred maximum overhead via UE Assistance Information. Request RAN2 to add new signalling for this purpose.

**Discussions:**

Apple: We can compromise to option 2. It provides flexibility. 2b is the best.

Nokia: we are fine with 2b.

Intel: we can compromise to option 2.

CMCC: we support option 2b. the intention is to preclude 20ms+20ms which is to occupying.

ZTE: option 3 increases UE implementation complexity. Option 2b is a good choice.

Vivo: eventually we can compromise to option 2. On option 2 we prefer option 2c. even we allow one 20ms, the overhead is still a lot. Option 2c provides better balance between overhead and complexity.

Qualcomm: we can compromise to option 2. The limitation is to cap the uoverhead to some number. 2b we prefer. We would like to see 20ms + low overhead MGRP. Option 2c cuts out a lot of combinations of such kind.

OPPO: we can go with option 2. We prefer option 2b. one note is that this applies to the case where the approximity rule is not met (overlap and one leg is dropped).

CATT: we also support option 2b.

Ericsson: we can also go with option 2b. we have concern on option 2c. 20ms is rather typical MGRP. We agree with Qualcomm comments.

Apple: to OPPO, the cap applies to all cases including overlap and non overlap. There seems no need to have the scope limitation.

OPPO: whether this applicability is only for per UE gaps or it is also accounted for by pre FR gaps.

Qualcomm: overhead cap applies only for gaps that are within the same FR.

MTK: we count the cap respectively in different FR-s. this restriction is for same FR gaps.

**Agreement:**

Regarding the overhead cap on concurrent gaps in Rel-17, measurement requirement does not apply when more than one MGP is configured with MGRP=20ms in an FR.

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**[104-e][212] NR\_MG\_enh\_2, AI 9.9.1.1 and 9.9.2.1 – Rui Huang**

**R4-2214132 Email Discussion Summary for [104-e][212] NR\_MG\_enh\_2**

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

**Abstract:**

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

**Decision: Revised to R4-2214264**

**R4-2214264 Email Discussion Summary for [104-e][212] NR\_MG\_enh\_2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214334 | WF for R17 NR MG enhancements – Pre-configured MG | Intel | Agreeable |
| R4-2214335 | Reply LS on LocationMeasurementIndication contents and measurement gap parameters | Huawei | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2211894](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2211894.zip) | R4-2214674 | Draft CR on Pre-MG TC1-2 | Apple | Agreeable |  |
| [R4-2212035](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2212035.zip) | R4-2214678 | Draft CR on Pre-MG TC1-5 | OPPO | Agreeable |  |
| [R4-2212077](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2212077.zip) | R4-2214512 | Maintenance CR on TS38.133 for Pre-MG core part (9.1.7.1, 9.1.7.2) | MediaTek | Agreeable | To include the agreed changes in 9.1.7.1 and 9.1.7.2 |
| [R4-2212082](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2212082.zip) | R4-2214680 | Draft CR on Pre-MG TC1-4 | MediaTek | Agreeable |  |
| [R4-2212133](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2212133.zip) | R4-2214684 | Draft CR on Pre-MG TC1-1 | Intel | Agreeable |  |
| [R4-2213062](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2213062.zip) | R4-2214520 | Maintenance CR on TS38.133 for Pre-MG core part (3.3, 8.19) | Nokia, Nokia Shanghai Bell | Agreeable | To include the agreed changes in 3.3 and 8.19 |
| [R4-2213507](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2213507.zip) | R4-2214521 | Maintenance CR on TS38.133 for Pre-MG core part (9.1.7.3,) | Huawei, HiSilicon | Agreeable | To include the agreed changes in 9.1.7.3 |
| [R4-2213513](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\104e\Docs\R4-2213513.zip) | R4-2214723 | Draft CR on Pre-MG TC1-3 | Huawei, HiSilicon | Agreeable |  |

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**GTW on Aug-19**

**Topic #2: Test cases for pre-configured gaps**

**Issue 2-1-1 CA test case**

* Option 1 (CMCC): Yes. Define additional test case for CA
* Option 2 (Apple, Huawei): No.

**Issue 2-1-2 Test case for the other trigger events beside BWP switching**

* Option 1 (CMCC): For UE autonomous pre-MG (de)activation, design test cases for other trigger events, e.g. MO addition/remove
* Option 2 (Apple, Huawei): No additional test case for other trigger events (e.g. MO addition/remove).

Proposal from 2-1-1 and 2-1-2 is to add one test case to test both CA and SCell activation triggering event.

**Discussions:**

CATT: SCell activation is a totally different trigger event than BWP switching.

Intel: we need to achieve tradeoff between test effort and coverage. SCell activation is not a typical trigger event.

Nokia: we agree with the proposal to test CA deployment. We should test it with minimized effort.

Apple: for pre configured MG, CA case is pretty much the same situation with single carrier. We prefer not to test CA.

Intel: we agree with Apple. From UE behaviour perspective, nothing is too different between signle carrier and CA, between SCell activation triggering and BWP switching triggering.

CMCC: our preference was to consider CA in test cases. We are also fine with option 2 since we recognize the similarity between CA and single carrier cases.

CATT: do we have MO addition as a trigger event? We can test CA in that case.

Intel:

Apple: MO addition test is still open. MO addition is through RRC configuration.

CATT: Test coverage is important.

MTK: if we converge test cases to CA cases, we lose test coverage for UE which does not support CA.

**Agreement:**

No additional test case is introduced for CA or for SCell activation triggering event.

**New issue 2-2-1 Testing procedure alignment among draftCRs:**

**check whether T4 is needed**

* T4 was designed to verify that the UE correctly receives data instead of measuring on the deactivated MG occations
* Up to 5s is observed in the draft Test cases for T4
* T1 can also accommodates the verification (before pre-MG activation)
* Moderator proposes to remove T4 from the design to save test time
* Option 1 (MTK, Apple, Huawei): The test consists of 4 successive time periods, with durations of T1, T2, T3 and T4, respectively. During T4, UE shall perform intra-frequency measurement with pre-MG deactivated.
* Option 2 (Intel): The test consists of 3 successive time periods, with durations of T1, T2, T3 respectively.

**Discussions:**

Intel: we can use T1 to test the measurement for deactivated MG in stead of T4 to save test time. Note that T4 is particularly long: up to 5s. we invite companies to comment on the fresh issue.

MTK: we are OK to the proposal.

Huawei: we are also fine with the proposal. We will update our draftCR if this was agreed.

Intel: all the draftCR need revisions. Please proponent update the TC according to the agreement.

**Agreement:**

Update the test cases to remove T4 from the previous designs and the test cases consist of 3 successive time periods T1, T2 and T3.

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**[104-e][213] NR\_MG\_enh\_3, AI 9.9.1.3 and 9.9.2.3 – Qiming Li**

**R4-2214133 Email Discussion Summary for [104-e][213] NR\_MG\_enh\_3**

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

**Abstract:**

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

**Decision: Revised to R4-2214265**

**R4-2214265 Email Discussion Summary for [104-e][213] NR\_MG\_enh\_3**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214336 | WF on NCSG | Apple | Agreeable |
| R4-2214337 | LS on UE capability indicating the support of deriveSSB-IndexFromCell-inter | Huawei, Hisilicon | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2211618](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211618.zip) |  |  | QC | Merged |  |
| [R4-2211722](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211722.zip) | R4-2214507 | CR on NCSG core requirements maintenance | CATT | Agreeable |  |
| [R4-2211723](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211723.zip) | R4-2214667 | Draft CR on test case of inter-freq measurement with NCSG in FR2 | CATT | Agreeable |  |
| [R4-2211897](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211897.zip) |  |  | Apple | Merged |  |
| [R4-2212036](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212036.zip) | R4-2214679 | Draft CR on TC6 for Event triggered reporting test on intra-frequency in FR1(A.6.6.X3.1) | OPPO | Agreeable |  |
| [R4-2212081](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212081.zip) | R4-2214514 | Maintenance CR on TS38.133 for NCSG core part | MTK | Agreeable |  |
| [R4-2212084](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212084.zip) |  |  | MTK | Agreeable |  |
| [R4-2212135](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212135.zip) | R4-2214686 | [draftCR] CR for NCSG test case No 5 | Intel | Agreeable |  |
| [R4-2212874](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212874.zip) |  |  | Nokia | Agreeable |  |
| [R4-2213063](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213063.zip) |  |  | Nokia | Agreeable |  |
| [R4-2213511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213511.zip) | R4-2214523 | CR on maintenance of NCSG requirements | HW | Agreeable |  |
| [R4-2213517](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213517.zip) | R4-2214725 | CR to introduce TC#3 for NCSG | HW | Agreeable |  |
| [R4-2213877](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213877.zip) |  |  | ZTE | Merged |  |
| [R4-2213882](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213882.zip) | R4-2214730 | Draft CR on test case for Event triggered reporting based on intra-frequency measurement with NCSG in FR2 in TS38.133 A.7.6.1.x | ZTE | Agreeable |  |
| [R4-2214054](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2214054.zip) | R4-2215107 | Relevant gap terminologies for different scenarios in TS 38.133 | Ericsson | Agreeable |  |
| [R4-2214055](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2214055.zip) | R4-2214528 | Correction to NCSG core requirements | Ericsson | Agreeable |  |
| [R4-2214057](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2214057.zip) |  |  | Ericsson | Agreeable |  |

.

**GTW on Aug-19**

**Topic #2: performance part**

**Issue 2-2: gap pattern in NCSG test**

* Proposals
  + Option 1: (QC)
    - For UE who support per-UE, NCSG pattern #3 is required to test short ML as same as legacy gap pattern in addition NCSG pattern #0. For UE who support per-FR, NCSG pattern #13 and #17 are configured.
  + Option 2: (Apple, HW)
    - NCSG pattern #0 for FR1 test
    - NCSG pattern #13 for FR2 test
  + Option 3: (CMCC)
    - NCSG pattern #2 for FR1 test
    - NCSG pattern #17 for FR2 test

**Discussions:**

Qualcomm: we can go with option 2.

CMCC: we support option 3. This issue is related to per FR NCSG. Both per UE and per FR NCSG are considered in the test cases. Applicability is there to guarantee test effort is limited. We need to introduce #2 for per FR NCSG for FR1 test. For FR2 per FR NCSG pattern either #13 or #17.

Nokia: we also support option 2.

Ericsson: we support option 2.

Apple: we support option 2. We can compromise to that we introduce one case in FR1 and one in FR2 to test perFR gaps.

Apple: moderator proposes to test perFR gaps in interfrequency test cases. We are also fine with #2 pattern.

CMCC: we are ok with the moderator proposal. We need to have 3 sub tests: 1 with #0 in FR1 per-UE gap, 1 with #2 in FR1 per-FR gap, and 1 with #13 in FR2 per-FR gap.

Apple: How do we have sub tests in different FR-s.

CMCC: For FR1 #0 and #2 are both tested in inter-frequency test cases as sub tests. For FR2 we test with per-FR gaps pattern #13.

**Agreement:**

For FR1 NCSG #0 per-UE gap and NCSG #2 per-FR gap are both tested in inter-frequency sub test cases. For FR2 we test with per-FR NCSG pattern #13.

**Topic #1: Core requirement maintenance**

**Issue 1-1: new optional UE capability for UE supporting NCSG indicating the support of deriveSSB-IndexFromCell-inter**

* Proposals
  + Option 1:
    - introduce a new optional UE capability for UE supporting NCSG indicating the support of *deriveSSB-IndexFromCell-inter*., and it implies that when deriveSSB-IndexFromCell-inter is enabled, (1) Tidentify\_inter\_without\_index is applicable to UE (2) UE is capable of serving cell communication within SMTC based on the agreed scheduling restriction associated with deriveSSB-IndexFromCell-inter (QC)
  + Option 1a:
    - Introduce a new UE capability related to deriveSSB-IndexFromCell-inter, and UE supporting the capability is required to meet the following requirements: (HW)
      * Cell identification delay Tidentify\_inter\_without\_index
      * Scheduling restriction during NCSG ML is on SSB symbol level
  + Option 2:
    - not necessary to introduce UE capability indicating support of deriveSSB-IndexFromCell-inter. (CMCC)
  + Option 3:
    - No new UE capability for UE supporting NCSG. Introduce a new UE capability for UE not supporting NCSG after R17(ZTE)

**Discussions:**

CMCC: We do not see the necessity to have the capability. We don’t have capability for intra case.

ZTE: we agree with CMCC. We support option 2.

Qualcomm: we support option 1 and 1a. It could be more challenging to UE when the UE needs to coordinate between RF chains for data and measurement.

OPPO: We prefer option 2. We recognize the reason to have capability. One compromise is to apply only scheduling restriction to the capable UE but not the cell identification delay reduction due to measurements without index reading.

Apple: we prefer option 1 and 1a. this network flag was introduced recently.

Ericsson: we also support option 2. It is complicated for the network to handle the capability. Regarding option 3, we would like to avoid discussing anything outside NCSG.

Huawei: this flag and feature has little to do with NCSG. It is reasonable to have the capability since they are separate features. We echo QC comments that it is demanding for the UE to coordinate between chains.

Intel: we have concerns to introduce capability. If the UE supports NCSG, such coordination between chains is assumed supported by the UE. Introducing capability is rather late. We support option 2 but could consider the compromise from OPPO and MTK.

CATT: we support option 2.

Nokia: we support option 1 and 1a. we need to allow powerful UE to have less interruption.

ZTE: the flag is introduced in NCSG scope. It allows the UE to have less interruption in general. For NCSG capable UE, basic assumption is that the UE is rather ppowerful in terms of coordination between chains.

Qualcomm: our concern is that when the flag is enabled, the UE uses the serving cell timing if the UE is using common beam module between the chains.

CMCC: to Qualcomm, if we introduce the capability is it only for FR2?

Qualcomm: we can do that.

**Tentative Agreements:**

Confirm that RAN4 specifies RRM requirements considering that the flag *deriveSSB-IndexFromCell-inter* is applied only to NCSG capable UE in Rel-17.

Introduce the optional capability in FR2 for the UE to indicate whether it is capable of

* + - * Scheduling restriction during NCSG ML is on SSB symbol level
      * FFS Cell identification delay Tidentify\_inter\_without\_index
      * FFS in FR1
      * FFS for UE not supporting NCSG

**Issue 1-4: NR-LTE inter-RAT measurement with ‘nogap-noncsg’**

* Proposals
  + Option 1: Define requirements for NR – LTE inter-RAT measurement without gap (UE reports ‘nogap-noncsg’ for inter-RAT measurement). (HW)
  + Option 2: No additional signalling is required to report ‘nogap-noncsg’ for inter-RAT measurements.
  + Option 3: FFS

**Discussions:**

CMCC: we support option 1. We are missing requirements for UE indicating nogap-noncsg.

Intel: in Rel-18 we have discussion on the scenarios for NR-LTE inter-RAT gapless measurement. It seems duplicate discussion.

Qualcomm: we are ok with option 1. But it is better to have the discussion in Rel-18.

Apple: we support option 1 for the completion of the feature. Regarding Rel-18, we prefer to have NCSG feature completed first.

Huawei: as proponent we support option 1. It is clearly missing part. It is already supported scenario in Rel-17. If the requirements are specified in R17, we may not need to have it in R18.

Nokia: we think it can be discussed in R18.

ZTE: we agree with Intel.

MTK: we support option 1. UE reports 2bits capability {gap, nogap, nogap-noncsg}. We need to specify the requirements.

Ericsson: we support option 1. How much is the load? It is better to discuss it in Rel-18. R18 WID is clearly covering this. This item is quite late now.

CATT: it is a new requirement after the closure. We are not sure how long does this work continue.

Vivo: we prefer option 1.

Intel: our concern is the same with Ericsson’s. it seems huge workload.

Apple: the workload is minor. There is already a concrete CR. This capability is only for inter-RAT LTE measurements. It is questionable whether R18 item covers this one.

CATT: we need to add test case for the core requirements if we agree to introduce.

Apple: we agreed no test for NCSG no gap indication.

Session Chair: encourage companies to have further discussion in the 2nd round checking: a) whether this feature is covered by the Rel-18 item scope; b) the CR from proponent to see if the workload is huge.

**Agreement:**

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

9.11.8 Moderator summary and conclusions

**[104-e][214] NR\_NTN\_solutions\_RRM\_1, AI 9.11.5 – CH Park**

**R4-2214134 Email Discussion Summary for [104-e][214] 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: Revised to R4-2214266**

**R4-2214266 Email Discussion Summary for [104-e][214] 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: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214471 | WF on NR NTN RRM requirements | Qualcomm Incorporated | Agreeable |
| R4-2214472 | LS to RAN2 on Network indication for applying enhanced cell reselection requirements | Huawei | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211958 |  | CR on active TCI state switching delay | Xiaomi | Agreeable |  |
| R4-2212152 | R4-2214576 | Serving cell evaluation and intra-frequency measurements of NTN UE cell reselections | Intel Corporation | Not pursued |  |
| R4-2212212 |  | CR on Abbreviations for NTN | LG Electronics Inc. | Agreeable |  |
| R4-2212398 |  | CR on TS38.133 NR NTN RRM requirements | MediaTek inc. | Agreeable |  |
| R4-2212851 | R4-2214600 | CR to TS 38.133: Corrections to cell re-selection for NR UE for satellite access | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212853 | R4-2214601 | CR to TS 38.133: Adding requirements for timing advance for satellite access | Nokia, Nokia Shanghai Bell | Postponed |  |
| R4-2212863 | R4-2214602 | CR to TS 38.133: Corrections to UE transmit timing and timing advance for satellite access | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2213474 | R4-2214628 | CR on UE transmit timing requirements for NTN | Huawei, HiSilicon | Agreeable |  |
| R4-2213519 | R4-2214633 | CR on on other RRM requirements for NTN | Huawei, HiSilicon | Agreeable |  |
| R4-2213521 | R4-2214634 | CR on intra-frequency measurement requirements for NTN | Huawei, HiSilicon | Agreeable |  |
| R4-2213522 | R4-2214635 | CR on cell reselection requirements for NTN | Huawei, HiSilicon | Agreeable |  |
| R4-2213930 |  | Draft CR on L1-RSRP measurements for Reporting in NTN | Apple | Agreeable |  |
| R4-2214059 |  | Satellite access band grouping for RRM requirements in TS 38.133 | Ericsson | Agreeable |  |

**GTW on Aug-18**

**Issue 1: Capability on the number of Measurement Carriers/Cells/SSBs**

**Proposals**

* Proposal 1: Huawei (R4-2213520)
  + Introduce UE capability for the number of target satellites the UE can monitor per carrier for LEO

**Moderator’s suggestion**

* Agree on Proposal 1, and fill in the following with exact wording (please also clarify the relationship with FG 25-5):
  + Feature group
  + Component
  + Need for the gNB to know if the feature is supported
  + Consequence if the feature is not supported by the UE
  + Type

**Discussions:**

Apple: firstly we are fine with Proposal 1. But for serving satellite, the satellite number should include serving cell. We should distinguish between serving carrier and non-serving carrier.

Thales: agree with proposal 1. For the target satellite in the capability, in practice the number of target of satellite is up to 12 for LEO. 2 satellites would not be enough. For test cases we can consider two. For the satellite that UE monitors, we should consider more.

Hughes: there is difference between statellite and NTN cells. Do you refer to satellite? Does satellite generate multiple beams or cells?

Moderator: Here is not about the number of satellite. This is per carrier. This is not the satellite number. It is the numbers per carrier. There is another feature list for fully colliding…

LGE: should the capability be finalized tomorrow?

ZTE: what is the network expected to do with this information?

Huawei: we understand exactly where the capability come from? RAN4 discussed the fixed values but there was no agreement. Thus we defined the capability. To Hughes, each satellite can generate more cells, which is not limited by this capability.

Moderator: same understanding as Huawei. This is about the number of satellite. A satellite can have multiple cells.

ZTE: Still my question is not answered. How does network use this capability. It does not bypass the LEO case.

Huawei: the network can use it to decide how many satellite can be configured for UE to measure. We understand if we do not have the capability it is difficult to define the requirement on the number of satellite that UE should monitor. This was agreed in RAN4.

Thales: Similar understanding as Huawei. Network should know how many satellite that UE can monitor.

Ericsson: Same understanding as previosu speaker about the ZTE question. The information can bring benefit to network configuration.

Qualcomm: same understanding. Another question if the network configures more than UE capability, which cells to be monitored depends on UE implementation.

ZTE: Are we going to introduce the requirements depending on the number of satellite?

Qualcomm: If the question is whether we are going to define the requiremetns when the configuration is beyond UE capability, the answer is no.

Huawei: we have direct requirement that UE should monitor. Agree with Qualcomm.

Ericsson: regarding ZTE question, we can have further discussion. Network can configure the different SMTC. Combining with this, we need think about how to connect the capability of supporting number of satellite and numbers of SMTC.

Samsung: the monitor satellite per carrier. Per carrier is confusing.

LGE: this is UE capability which has impact on the total number of satellite to be monitored on TN carrier.

Apple: to LGE, why do we need consider TN carrier? Should we still monitor the carrier on TN carrier?

LGE: in my understanding, we have max layers to be monitored for NTN, say 3 and 7. This capability is related to these number or not.

Qualcomm: to LGE, this capability is about per carrier. TN and NTN carrier should be exclusive. In the future, there may be some cases but now there is no case what LGE commented.

**Agreement:**

* Introduce UE capability for the number of target satellites the UE can monitor per carrier for LEO
* Fill in the following with exact wording (please also clarify the relationship with FG 25-5):
  + Feature group
  + Component
  + Need for the gNB to know if the feature is supported
  + Consequence if the feature is not supported by the UE
  + Type

**Issue 3. SMTC collision condition**

**Proposals**

* Proposal 1: Apple (R4-2211849)
  + For SMTC inside MG and SMTC outside MG, as long as the proximity distance between MG and SMTC outside MG are less than the proximity distance threshold, SMTC inside MG and SMTC outside MG are considered as colliding case.

**Moderator’s suggestion**

* Based on Proposal 1, agree on the following proposal.
  + For the case where one SMTC is inside MG and the other SMTC is outside the MG, if the proximity distance between the MG and SMTC outside the MG is smaller than or equal to the proximity distance threshold, i.e. 4ms, the two SMTCs are considered as colliding SMTCs.

**Discussions:**

Ericsson: the basic principle on this topic is correct. In the CR, should we define the collision between SMTC and MG? we have no objection to principle.

OPPO: we have concern on the SMTC within the gap. Can we change it to SMTC associated with gap?

Apple: To Ericsson, so far the ceiling scaling is to share the sources. We have no such mixed case. In the CR, we can address the question. To OPPO, we are fine to change SMTC associate with gap. Normall is SMTC associated with gap is the SMTC within the gap.

Qualcomm: not very sure whether we have all the information from the perspective of signalling. The current wording is more accurate.

**Agreement:**

* For the case where one SMTC is inside MG and the other SMTC is outside the MG, if the proximity distance between the MG and SMTC outside the MG is smaller than or equal to the proximity distance threshold, i.e. 4ms, the two SMTCs are considered as colliding SMTCs.

**Issue 4. Fully Overlapping Concurrent MGs**

*Agreements (from RAN4#103)*

* *For non-fully overlapped case: Priority rule applied*
* *FFS how to address concurrent MGs fully overlapped cases in maintenance phase*

**Proposals**

* Proposal 1: Apple (R4-2211849), Xiaomi (R4-2211957), Ericsson (R4-2213355)
  + For fully overlapped case, gap sharing rule is applied during the collided gap occasions, and the scaling factor is 2
* Proposal 2: Huawei (R4-2213520)
  + Do not define requirements for fully overlapping concurrent MGs

**Moderator’s suggestion**

* Further discussion
* Moderator’s Proposal: For fully overlapped case, gap sharing rule is applied during the collided gap occasions, and the scaling factor is 2
  + 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.

**Discussions:**

Ericsson: agree on the proposals. We do not agree with the second bulltes. The rule should be studied.

Qualcomm: what is the specific concern that you see here? Otherwise network will use the union of MGs to avoid dropping and there is resource wasted. I do not think we need introduce any flexiblity other than this.

Apple: share the same concern as Ericsson. We are not sure if we use the fixed pattern in round robin way or we use configurable gaps. And we need more time to check.

Mediatek: share the same concern. Not sure if the fixed pattern is the best way to do.

LGE: share the same cocern. For capability, why do we need this capability. If UE supports the concurrent gap, UE should support fully overlapping.

Mediatek: we do not understanding why we need capability.

Qualcomm: I do not get any points from the comments. The only question is which one should be selected first. The rule is quite simple. There is network choise. Network can configure. Is there any comparable pattern? As compromise we propose it.

Mediatek: On UE behaviour on the dropping rule, if one gap is dropped and UE can still receive data, what is the UE behaviour of droping rule since on one carrier UE may have two satellite.

Apple: how to design the pattern. It should depend on the network traffic. We should study first.

Ericsson: share the similar view as Apple. We do not think this is the only one. About the new UE capability to support fully overlapping gap, we have concern what is the meaning of capability and why we need this capability.

Qualcomm: The discussion is out of our expectation. The core is completed. Just because we accommodate some uncertainty, we can agree with compromise and come up with scaling factor 2. But companies comment on pattern. I do not know why pattern is needed.

Qualcomm: suggest to go with option 2.

Huawei: as compromise, we can consider to leave sharing to UE implementation. We do define the scaling factor but not specify the dropping pattern.

LGE: if the sharing mechamis is introduced, the same priority measurement gap configuration for fully overlapping case should be defined and captured.

Qualcomm: regarding to compromise, we do not buy the argument and should have capability. UE does not really need this large number for measurement since this is satellite. UE cannot even support direct antenna. UE need repeatation.

**FFS on the fully overlapped case:**

* For fully overlapped case, gap sharing rule is applied during the collided gap occasions, and the scaling factor is 2
* Do not define the dropping pattern in Rel-17

**FSS on the fully overlapped case:**

* For fully overlapped case, gap sharing rule is applied during the collided gap occasions, and the scaling factor is 2
  + 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.

**Issue 5. Maximum interruption in paging reception**

**Proposals**

* Proposal 1: Huawei (R4-2213518)
  + Remove the requirements for unknown case for paging interruption

**Moderator’s suggestion**

* Agree on Proposal 1.
* Moderator proposal:
  + Proposal: For the requirement of maximum interruption in paging reception, if the target cell is unknown, a longer interruption can be expected.

**Discussions:**

Xiaomi: we can go with moderator proposal.

Ericsson: what is the unknown condition? This unknown condition is different from other measurement requirements. Even if UE complete the neighbour before Tservice, there is no interruption. Should we add the extra restriction?

Huawei: to Ericsson, the known condition is discussed and captured in the spec. It is the same as Ericsson comment based on timing. For the second question, it is concern with UE behaviour when Tservice is reached what UE should do. This is not discussed in RAN4. After 10ms, UE should trigger cell selection, which is suggested by Ericsson and specified in RAN2.

Ericsson: for 1st question, the known condition is clear. We should define the unknown condition. We wonder if any reader understand the unknown condition. Unknown condition is very limited. For 2nd one, we just clarify if there is any ambiguity on UE behaviour as Huawei mentioned.

**Agreement:**

* For the requirement of maximum interruption in paging reception, if the target cell is unknown, a longer interruption can be expected.
  + Unknown condition means that UE starts measurement but does not complete the measurement before Tservice.

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**[104-e][215] NR\_NTN\_solutions\_RRM\_2, AI 9.11.6 – Xuhua Tao**

**R4-2214135 Email Discussion Summary for [104-e][215] 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: Revised to R4-2214267**

**R4-2214267 Email Discussion Summary for [104-e][215] 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: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214473 | WF on performance requirements for NTN | Xiaomi | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211639 | R4-2214885 | Test cases for Intra- and inter-frequency HO with known cell for NTN | CATT | Agreeable |  |
| R4-2211640 | R4-2214886 | Test cases for Intra- and inter-frequency CHO for NTN | CATT | Agreeable |  |
| R4-2211960 |  | CR on measurement accuracy requirement for NTN | Xiaomi | Merged to R4-2213524 |  |
| R4-2211962 |  | CR on UE conditions for measurement performance requirements for NTN | Xiaomi | Merged to R4-2214061 |  |
| R4-2211963 | R4-2214570 | CR on test case for cell reselection to FR1 intra-frequency NR cell for satellite access | Xiaomi | Agreeable |  |
| R4-2212184 | R4-2214943 | draft CR of BWP switch and CBW change test cases | Qualcomm |  | Endorse R4-2212184  Withdraw R4-2214943 |
| R4-2212400 | R4-2214954 | Introduction of test cases for Inter-frequency measurement delay for satellite access with gap | MediaTek | Agreeable |  |
| R4-2212401 | R4-2214955 | Introduction of test cases for Accuracy for SS-RSRQ for satellite access | MediaTek |  | Endorse R4-2212401  Withdraw R4-2214955 |
| R4-2213352 | R4-2215048 | draft CR on test cases for Beam Failure Detection and Link Recover for NTN | Ericsson |  | Endorse R4-2213352  Withdraw R4-2215048 |
| R4-2213353 | R4-2215049 | draft CR on test cases for L1-RSRP measurement delay for NTN | Ericsson |  | Endorse R4-2213353  Withdraw R4-2215049 |
| R4-2213476 | R4-2215062 | DraftCR on UE transmit timing tests for NTN | Huawei |  | Endorse R4-2213476  Withdraw R4-2215062 |
| R4-2213524 |  | CR on measurement accuracy requirements for NTN | Huawei | Agreeable |  |
| R4-2213525 | R4-2215066 | CR on TCs for SSB based RLM for NTN | Huawei |  | Endorse R4-2213525  Withdraw R4-2215066 |
| R4-2213526 | R4-2215067 | CR on TCs for intra-frequency measurement delay for NTN | Huawei |  | Endorse R4-2213526  Withdraw R4-2215067 |
| R4-2213527 | R4-2215068 | CR on TCs for RRC Re-establishment for NTN | Huawei |  | Endorse R4-2213527  Withdraw R4-2215068 |
| R4-2213528 | R4-2215069 | CR on TCs for RSRP accuracy for NTN | Huawei |  | Endorse R4-2213528  Withdraw R4-2215069 |
| R4-2214061 |  | Conditions for RRM requirements for satellite access band in TS 38.133 | Ericsson | Agreeable |  |

**GTW on Aug-18**

**Issue 1-1: Margin assumption for evaluating measurement accuracy.**

* Option 1: (CATT)
  + The margin for propagator model error should not be introduced when evaluating the accuracy performance. It can be considered in RAN5 test tolerance.
* Option 2: (LGE)
  + For evaluating measurement accuracy, introduce margin for propagator model error.
* Option 3: (Huawei)
  + RAN4 to discuss the assumption on the time and frequency error and the side condition related to ephemeris information for the accuracy requirements. Inputs from the satellite system vendors are appreciated.
* Recommended WF
  + Companies are encouraged to provide the views on this issue.

**Discussions:**

Ericsson: we support option 1. We do have clear definition of the propagator model error. We can consider support option 2 and 3 if the error is clearly defined.

Moderator: most companies are fine to consider the model error. Then we can evaluate how much the error will be.

Thales: support option 2 and 3. The test purpose is as realistic as much possible. UE may use different compensataion.

CATT: this issue is relation with the second issue. What is the defition of the margin.

**Agreement:**

* RAN4 considers propagator model error and timing/frequency error when defining the measurement accuracy.
  + FFS on the values of propagator model error and timing/frequency error
  + FFS on the defition of propagator model error

**Issue 1-2: Measurement accuracy.**

* Option 1: (Xiaomi)
  + 0.5dB is relaxed based on existing SS-RSRP accuracy requirements for NTN measurement.
* Option 2: (Nokia)
  + RAN4 should decide to keep the measurement accuracy at least as accurate as in terrestrial networks and should consider tightening the requirements further.
* Recommended WF
  + Companies are encouraged to provide the views on this issue.

**Discussions:**

Nokia: since the previous agreement is going to introduce the margin, we support option 2 and keep to maintain the legacy accuracy requirement for the time being.

Xiaomi: Since the first issue has agreement, we need to relax the accuracy requirement.

Apple: we agree with Xiaomi. The exact value of relaxation is FFS.

Ericsson: Is Nokia to say the current the requirement should be maintained regardless…

CMCC: we prefer to keep the existing values for further study.

Thales: for Option 2, it depends on how much the accuracy is. What does it mean tightening the requirements? We prefer option 1. Last time we provide the propagator error meaning. In RAN4 it is important to consider the error.

LGE: we agree with Apple. The relaxation value can be FFS.

Qualcomm: Support option 1. Regarding concern from network side, it is about the mobility. The overlapping range is very large. There is no clear line between two cells.

Nokia: the leagacy is used as starting point. Our intention is not to tighten the requirement for NTN. If we introduce 0.5 relaxation and we introduce error in the previous agreement, do we double the relaxation?

Xiaomi: there is no double relaxation. 0.5dB is value considering the propagator model error.

Qualcomm: same understanding as Xiaomi. It is only applied to SS\_RSPR or applied to other requirements.

Xiaomi: it can be applied to SS-RSRP and SS-RSRQ. Not sure if it is applied to others.

Nokia: we confuse here.

**Issue 2-2: Test coverage regarding NTN RRM requirements.**

* Option 1: (Huawei)
  + RAN4 not to define the following TCs for NTN.
    - Random access
    - PL-RS switching
    - Intra-frequency measurement with gap
    - Inter-frequency measurement without gap
* Recommended WF
  + Companies are encouraged to provide the views on this issue.

**Agreement:**

* Define the following TCs for NTN
  + Random access
  + PL-RS switching
  + Intra-frequency measurement with gap
  + Inter-frequency measurement without gap
* And define the applicability rule to avoid the duplication of test for a UE.

**Issue 2-4: Test coverage regarding multiple SMTCs.**

* Option 1: (Ericsson)
  + Test cases shall take multi-SMTC and multi-satellite tests into account.
  + Add new contents for definition of 2 SMTCs per MO, 2 satellites (i.e. 2 SSBs) per SMTC, 2 MGs in clause A.3 RRM test configuration.
* Option 2: (LGE)
  + To verify reporting of propagation delay difference between serving and neighbor cells, the intra-frequency measurement accuracy test should consider updating SMTC configuration according to the reported propagation delay difference.
* Recommended WF
  + Companies are encouraged to provide the views on this issue.

**Discussions:**

LGE: this is new UE behaviour and there is no test case. And we need verify it.

Qualcomm: This is different. It is like network comformance test. But our test is between UE and TE. UE just needs measure and report. That is not mandated by spec. For option 1, with the second bullet, question about the number of satellite.

OPPO: it should be applied according to UE capability. If UE supports one MG, one MG should be configured. For GEO two satellite can be considered as one.

Ericsson: we are open to discussion on the second bullet. We can discuss the exact numbers.

Qualcomm: Ericsson has good point. We can have different periodicity for SMTC.. and have proper configuration to verify UE capability for measurement under colliding rule. We can minimize the test cases.

**Agreement:**

* Test cases shall take multi-SMTC and multi-satellite tests into account.
  + Minimize the test case number.
* FFS on the following bullet
  + “Add new contents for definition of 2 SMTCs per MO, 2 satellites (i.e. 2 SSBs) per SMTC, 2 MGs in clause A.3 RRM test configuration.”
* FFS on Option 2.

**Issue 2-5: Serving and Neighbour Satellite configurations.**

* Option 1: (Qualcomm)
  + RAN4 to define the following NTN specific configurations for GEO and LEO at 600km altitude in a common section, which can be referred to from NTN RRM test cases:
    - Common configurations for Serving and Neighbor satellites, e.g.
      * SSC.1 and SSC.2 are Serving Satellite Configurations for GSO and NGSO, respectively.
      * NSC.1 and NSC.2 are Neighbor Satellite Configurations for GSO and NGSO, respectively.
      * For NGSO, a deployment of quasi-earth fixed cell is assumed.
      * For each set of configurations, NTN specific parameters in System information shall be included.
      * UE specific NTN parameters, if needed, are separately defined.
    - Cells belonging to the same satellite can have different parameters for, e.g.
      * Koffset, Kmac, beam footprint information, cell service time, etc.
    - FFS on exact values and parameters
      * The values should be derived based on a realistic satellite constellation with respect to UE position
    - In order to alleviate the impact of uncertainty on UE uplink transmission timing due to quantized feeder link delay information, the feeder link delay can be set to zero.

|  |  |
| --- | --- |
| Qualcomm | Proposals do not seem mutually exclusive.  To accommodate all points, maybe we can add the following to Option 1 and call it Option 1a.   * Ephemeris information in SSC.1 and SSC.2 is in format of position and velocity state vector * Ephemeris information in NSC.1 and NSC.2 is in format of orbital parameters * For those test cases where UE is required to transmit UL to a cell in a neighbour satellite, ephemeris information of the satellite in format of position and velocity state vector shall be additionally provided. |

* Option 2: (Huawei)
  + Two types of reference NTN configuration need to be introduced for GSO and NGSO scenarios respectively.
    - Reference NTN configuration 1 provides the typical NTN configuration in GSO scenario.
    - Reference NTN configuration 2 provides the typical NTN configuration in NGSO scenario.
  + RAN4 shall decide which format, format of position and velocity state vector or format of orbital parameters, will be used to provide satellite ephemeris in reference NTN configuration.
* Option 3: (Nokia)
  + To include, in the list of test configurations, reference scenarios for emulation of common delay parameters for NGO and NGSO.
  + To include, in the list of test configurations, reference scenarios for emulation of ephemeris information for NGO and NGSO.
* Recommended WF
  + Companies are encouraged to provide the views on this issue.

**Discussions:**

Qualcomm: PVT is nessary for connection. For neighbour cells UE does not need very accurate information.

**Agreement:**

* Take option 1 as baseline to further discuss how to configure the satellite parameters.

**GTW on Aug-25**

**Sub-topic 8-1: Test case list for NTN RRM**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Group of requirements | | TC index | Test case | Section ID | Candidate company | Comments |
| Cell reselection for satellite access | | 1-1 | Cell reselection to FR1 intra-frequency NR cell | A.14.1.a1 | Xiaomi |  |
| 1-2 | Cell reselection to FR1 intra-frequency NR cell for UE configured with [capability for enhanced requirements] | A.14.1.a2 | Xiaomi |  |
| 1-3 | Time-based cell reselection to FR1 intra-frequency NR cell | A.14.1.a3 | Xiaomi |  |
| 1-4 | Location-based cell reselection to FR1 intra-frequency NR cell | A.14.1.a4 | Xiaomi |  |
| 1-5 | Cell reselection to FR1 inter-frequency NR cell | A.14.1.a5 | LGE |  |
| 1-6 | Cell reselection to FR1 inter-frequency NR cell for UE configured with [capability for enhanced requirements] | A.14.1.a6 | LGE |  |
| 1-7 | Time-based cell reselection to FR1 inter-frequency NR cell | A.14.1.a7 | LGE |  |
| 1-8 | Location-based cell reselection to FR1 inter-frequency NR cell | A.14.1.a8 | LGE |  |
| Handover for satellite access | | 2-1 | Intra-frequency Handover from FR1 to FR1 | A.14.2.1.b1 | CATT |  |
| 2-2 | Inter-frequency Handover from FR1 to FR1 | A.14.2.1.b2 | CATT |  |
| 2-3 | Intra-frequency time-based Conditional Handover from FR1 to FR1 | A.14.2.1.b3 | CATT |  |
| 2-4 | Inter-frequency time-based Conditional Handover from FR1 to FR1 | A.14.2.1.b4 | CATT |  |
| 2-5 | Intra-frequency distance-based Conditional Handover from FR1 to FR1 | A.14.2.1.b5 | CATT |  |
| 2-6 | Inter-frequency distance -based Conditional Handover from FR1 to FR1 | A.14.2.1.b6 | CATT |  |
| RRC Connection Mobility Control | RRC Re-establishment for satellite access | 3-1-1 | Intra-frequency RRC Re-establishment in FR1 | A.14.2.2.1.c1 | Huawei |  |
| 3-1-2 | Inter-frequency RRC Re-establishment in FR1 | A.14.2.2.1.c2 | Huawei |  |
| Random access for satellite access | 3-2-1 | 4-step RA type contention based random access test in FR1 | A.14.2.2.2.d1 |  |  |
| 3-2-2 | 4-step RA type non-contention based random access test in FR1 | A.14.2.2.2.d2 |  |  |
| RRC Connection Release with Redirection for satellite access | 3-3-1 | Redirection from FR1 to FR1 | A.14.2.2.3.e1 |  |  |
| UE timing requirements for satellite access | | 4-1 | NTN UE transmit timing test | A.14.3.1.f1 | Huawei |  |
| 4-2 | NTN UE timing advance adjustment accuracy test | A.14.3.2.g1 | CMCC |  |
| RLM requirements for satellite access | | 5-1 | Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode | A.14.4.1.h1 | Huawei |  |
| 5-2 | Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode | A.14.4.1.h2 | Huawei |  |
| 5-3 | Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode | A.14.4.1.h3 | Huawei |  |
| 5-4 | Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode | A.14.4.1.h4 | Huawei |  |
| 5-5 | Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM RS in non-DRX mode | A.14.4.1.h5 | CMCC |  |
| 5-6 | Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM RS in DRX mode | A.14.4.1.h6 | CMCC |  |
| 5-7 | Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM RS in non-DRX mode | A.14.4.1.h7 | CMCC |  |
| 5-8 | Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM RS in DRX mode | A.14.4.1.h8 | CMCC |  |
| Beam Failure Detection and Link Recovery for satellite access | | 6-1 | Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode | A.14.4.2.i1 | Ericsson |  |
| 6-2 | Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode | A.14.4.2.i2 | Ericsson |  |
| 6-3 | Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode | A.14.4.2.i3 | Ericsson |  |
| 6-4 | Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode | A.14.4.2.i4 | Ericsson |  |
| 6-5 | Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and SSB-based LR in non-DRX mode | A.14.4.2.i5 | Ericsson |  |
| 6-6 | Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and SSB-based LR in DRX mode | A.14.4.2.i6 | Ericsson |  |
| Active BWP switch delay for satellite access | | 7-1 | NR FR1 DCI-based DL active BWP switch with non-DRX | A.14.4.3.j1 | Qualcomm |  |
| 7-2 | NR FR1 RRC-based DL active BWP switch with non-DRX | A.14.4.3.j2 | Qualcomm |  |
| UE-specific CBW change for satellite access | | 8-1 | UE specific CBW change on PCell in FR1 in non-DRX | A.14.4.4.k1 | Qualcomm |  |
| Pathloss reference signal switching delay for satellite access | | 9-1 | MAC-CE based pathloss reference signal switch | A.14.4.5.m1 |  |  |
| Intra-frequency measurement delay for satellite access | | 10-1 | Event triggered reporting tests without gap under non-DRX | A.14.5.1.n1 | Huawei |  |
| 10-2 | Event triggered reporting tests without gap under DRX | A.14.5.1.n2 | Huawei |  |
| 10-3 | Event triggered reporting tests without gap under non-DRX with SSB index reading | A.14.5.1.n3 | Huawei |  |
| 10-4 | Event triggered reporting tests with measurement gap under non-DRX | A.14.5.1.n4 | OPPO |  |
| 10-5 | Event triggered reporting tests with measurement gap under DRX | A.14.5.1.n5 | OPPO |  |
| 10-6 | Event triggered reporting tests with measurement gap under non-DRX with SSB index reading | A.14.5.1.n6 | OPPO |  |
| 10-7 | Event triggered reporting tests with FNO concurrent gaps under non-DRX | A.14.5.1.n7 | OPPO |  |
| 10-8 | Event triggered reporting tests with FNO concurrent gaps under DRX | A.14.5.1.n8 | OPPO |  |
| 10-9 | Event triggered reporting tests with PPO concurrent gaps under non-DRX | A.14.5.1.n9 | OPPO |  |
| Inter-frequency measurement delay for satellite access | | 11-1 | Event triggered reporting tests without gap under non-DRX | A.14.5.2.o1 |  |  |
| 11-2 | Event triggered reporting tests without gap under DRX | A.14.5.2.o2 |  |  |
| 11-3 | Event triggered reporting tests without gap under non-DRX with SSB index reading | A.14.5.2.o3 |  |  |
| 11-4 | Event triggered reporting tests with measurement gap under non-DRX | A.14.5.2.o4 | MTK |  |
| 11-5 | Event triggered reporting tests with measurement gap under DRX | A.14.5.2.o5 | MTK |  |
| 11-6 | Event triggered reporting tests with measurement gap under non-DRX with SSB index reading | A.14.5.2.o6 | MTK |  |
| 11-7 | Event triggered reporting tests with FNO concurrent gaps under non-DRX | A.14.5.2.o7 | MTK |  |
| 11-8 | Event triggered reporting tests with FNO concurrent gaps under DRX | A.14.5.2.o8 | MTK |  |
| 11-9 | Event triggered reporting tests with PPO concurrent gaps under non-DRX | A.14.5.2.o9 | MTK |  |
| L1-RSRP measurement delay for satellite access | | 12-1 | SSB based L1-RSRP measurement when DRX is not used | A.14.5.3.p1 | Ericsson |  |
| 12-2 | SSB based L1-RSRP measurement when DRX is used | A.14.5.3.p2 | Ericsson |  |
| 12-3 | CSI-RS based L1-RSRP measurement when DRX is not used | A.14.5.3.p3 | Ericsson |  |
| 12-4 | CSI-RS based L1-RSRP measurement when DRX is used | A.14.5.3.p4 | Ericsson |  |
| RRM measurement accuracy for satellite access | | 13-1 | Intra-frequency SS-RSRP measurement accuracy with FR1 serving cell and FR1 target cell | A.14.6.1.q1 | Huawei |  |
| 13-2 | Inter-frequency SS-RSRP measurement accuracy with FR1 serving cell and FR1 target cell | A.14.6.1.q2 | Huawei |  |
| 13-3 | Intra-frequency SS-RSRQ measurement accuracy with FR1 serving cell and FR1 target cell | A.14.6.2.r1 | MTK |  |
| 13-4 | Inter-frequency SS-RSRQ measurement accuracy with FR1 serving cell and FR1 target cell | A.14.6.2.r2 | MTK |  |
| 13-5 | Intra-frequency SS-SINR measurement accuracy with FR1 serving cell and FR1 target cell | A.14.6.3.s1 |  |  |
| 13-6 | Inter-frequency SS-SINR measurement accuracy with FR1 serving cell and FR1 target cell | A.14.6.3.s2 |  |  |
| 13-7 | SSB based L1-RSRP measurement accuracy | A.14.6.4.t1 |  |  |
| 13-8 | CSI-RS based L1-RSRP measurement accuracy on resource set with repetition off | A.14.6.4.t2 |  |  |

**Discussions:**

**Agreement:**

RAN4 agrees on the above test cases list for NTN R17 perf.

**New Issue 2-9: Test coverage regarding DRX and non-DRX**

* + Option 1:
  + Select either non-DRX or DRX of each sub-test to test.
  + Option 2:
  + Define TCs for both DRX and non-DRX

**Chair Proposal: go with option 2.**

**Discussions:**

**Agreement:**

Option 2 is agreed.

**Issue 2-2: Test coverage regarding NTN RRM requirements.**

* + Discuss the applicability rule, and the following options are proposed for further discussion:
  + Option 1:
  + RAN4 to define test cases for all NTN RRM requirements;
  + Option 2:
  + RAN4 to define test cases for NTN specific requirements;
  + For those NTN requirements that are the same as TN requirements, if a UE passes the test cases for TN requirements, then the UE does not need to pass the test cases for NTN requirements.
  + Option 3:
  + For NTN capable UE, RAN4 to define test cases for all NTN RRM requirements;
  + For TN/NTN capable UE, the UE shall pass the TCs for NTN specific requirements and does not need to pass the TCs for the requirements are the same as TN requirements.

**Discussions:**

**Agreement:**

Agree on option 3.

9.12 UE Power Saving Enhancements for NR

9.12.4 Moderator summary and conclusions

**[104-e][216] NR\_UE\_pow\_sav\_enh, AI 9.12.1, 9.12.2 – Hsuanli Lin**

**R4-2214136 Email Discussion Summary for** **[104-e][216] NR\_UE\_pow\_sav\_enh**

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

**Abstract:**

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

**Decision: Revised to R4-2214268**

**R4-2214268 Email Discussion Summary for [104-e][216] NR\_UE\_pow\_sav\_enh**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214474 | WF on RLM/BFD relaxation for UE Power Saving enhancements | MediaTek Inc | Agreeable |
| R4-2214475 | Reply LS to RAN2 on RLM/BFD relaxation | vivo | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2211599](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211599.zip) | R4-2214561 | CR: Power Saving Multiple RS Handling Clarification | Qualcomm, Inc. | Agreeable | Pending on discussion |
| [R4-2211684](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211684.zip) | R4-2214887 | Draft CR on RRM test case for RLM relaxation based on SSB in FR2 for EN-DC | CATT | Agreeable | Suggestion received |
| [R4-2212258](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212258.zip) | R4-2214947 | [darftCR] SSB based BFD and and LR for FR2 PSCell (TC 13) | ZTE Corporation | Agreeable | Suggestion received |
| [R4-2212275](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212275.zip) | R4-2214579 | 38133CR on relaxed RLM/BFD measurement requirement | Nokia, Nokia Shanghai Bell | Postponed | Pending on discussion |
| [R4-2212276](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212276.zip) | R4-2214948 | draftCR on TC for CSI-RS-based BFD and LR | Nokia, Nokia Shanghai Bell | Agreeable | Suggestion received |
| [R4-2212301](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212301.zip) | R4-2214949 | Draft CR on TS38.133 for relaxed RLM test for FR1 Pcell configured with CSI-RS-based RLM in NR SA mode | CMCC | Agreeable | Suggestion received |
| [R4-2212662](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212662.zip) |  | CR on R17 RLM and BFD relaxation for UE power saving | vivo | Merged | Changes on 8.1.1.1, 8.5.1.1 to be merged with 1599 |
| [R4-2213464](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213464.zip) | R4-2215060 | CR on TS38.133 for relaxed RLM test for FR1 PSCell configured with SSB-based RLM RS in EN-DC mode (A.4.5.1.X) | MediaTek inc. | Agreeable | Suggestion received |
| [R4-2213477](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213477.zip) | R4-2214629 | CR on maintaining RLM/BFD relaxation requirements | Huawei, HiSilicon | Agreeable | Changes on 8.1.1.1, 8.5.1.1 to be merged with 1599 |
| [R4-2213576](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213576.zip) | R4-2214640 | CR on TS38.133 for applicability of RLM measurement relaxation | MediaTek inc., Qualcomm Incorporated | Agreeable | For editorial changes |

**GTW on Aug-15**

**Topic #2: RRM performance requirements**

**Issue 2-1-1: Test set up on relaxation criterion**

* Proposals
  + Option 1: Only good serving cell quality criterion is configured. (QC, Huawei)
  + Option 2: Test cases are configured when both low mobility and good serving cell quality criteria are configured and fulfilled. (CATT, CMCC)
  + Option 3: Good serving cell criterion is always configured in testing, while low mobility criteria is configured, i.e. tested, in some of the test cases. (vivo)
  + Option 3a: For TC1, both low mobility criterion and good serving cell quality criterion are configured. For other TCs, only good serving cell quality criterion is configured (MTK)
* Recommended WF
  + Consider Option 3 or Option 3a as WF.

**Discussions:**

Huawei: we prefer option 1. For option 3, we do not see the companies provide the methodology. How is the evaluation done?

CMCC: low mobility is the same important as cell quality criterion. In the test both should be configured. Low mobility should be configured.

CATT: we also support option 2. Low mobility criterion is also important. For Huawei question, in last meeting, the agreement is that T1 has been extended. RAN2 defined two threshold. It can be evaluated for low mobility criterion.

Qualcomm: we support Huawei.

Nokia: we also think we should consider low mobility criterion. Low mobility criterion for BFD or RLM

Ericsson: similar to Nokia.

Huawei: for low mobility criterion, we choose either RLM or BFD.

**Agreement:**

* Configure low mobility criterion and good cell quality criterion for limited number of test cases
  + Futher discussion on candidate test cases considering the following options:
    - Option 1: one FR1 SSB-based RLM test case (test case #1) and one FR2 BFD test case (test case #16).
    - Option 2: Test case(s) where low mobility criterion is evaluated based on SSB, and RLM or BFD are evaluated based on CSI-RS
* Configure only good cell quality criterion for the rest of test cases

**Issue 2-1-2: Test set up on the number of RSs**

* Proposals
  + Option 1: To simplify the test configuration, configure one reference signal for RLM and BFD power saving test cases. (QC, vivo)
  + Option 2: Distribute the test cases under the multiple RLM/BFD-RSs configured scenario and the single RLM/BFD-RS configured scenario. For example, TC1 and TC16 configure two RLM/BFD-RSs, TC4, TC5 and TC13 configure single RLM/BFD-RS. (CMCC)
* Recommended WF
  + Discuss proposals.

**Discussions:**

CMCC: multiple RSes are allowed to be configured. The UE behaviour is different from single RS case. We are fine to choose one or two test cases to verify the UE behaviour.

Mediatek: We suggest to agree on the single RS for FR1. We are open to discuss FR2 test case.

Qualcomm: FR2 BFD can be with multiple RS. The rest test cases are with single RS. For one functionality, we just test one case.

Vivo: for multiple RS case, they are not tested. In Rel-17 why should we test it?

**Agreement:**

* Choose one test case with multiple RS configured
  + Revisit the above agreement if needed when the maintenance part for multiple RS is concluded.
* For the rest test cases, configure the single RS.

**Issue 2-2-1: RLM OOS test – exit relaxation mode during T2 or T3**

* Proposals
  + Option 1: UE is expected to exit relaxation mode during T2 (Huawei)
    - SNR2 is set to be lower than the threshold (Qin + XdB) but higher than the threshold Qout.
    - UE shall send OOS indication based legacy RLM evaluation during T3.
    - The length of D1 is calculated based on legacy RLM evaluation period.
  + Option 2: UE is expected to exit relaxation mode during T3 (Huawei)
    - SNR2 is set as same as SNR1 which is higher than the threshold (Qin + XdB).
    - UE is allowed to send OOS indication based relaxed RLM evaluation during T3.
    - The length of D1 is calculated based on relaxed RLM evaluation period.
* Recommended WF
  + Moderator’s understanding is most of proposals on D1 assumed Option 2 based on relaxed RLM evaluation period.

**Discussions:**

Moderator: most companies agree on option 2.

Qualcomm: we support option 2.

Vivo: for option 2, threshold is under discussion in the core part maintainence.

CATT: support option 2.

Nokia: why do we consider D1 is calculated depend on the relaxation mode?

Qualcomm: D1 includes the evalution. When you drop SNR, you have to allow UE to evaluate and then exit. Exit part should follow the normal behavior. Evaluation part needs relaxation.

CMCC: we also notice that there is open issue 1-4 whether there is typo in the last meeting agreement.

Qualcomm: Your concern is that whether there is impact on core requirement for entering threshold if we agree on this.

CMCC: if we configure multiple referenc signals, we should

Mediatek: Option 2 does not preclude multiple RS case.

**Agreement:**

* Option 2: UE is expected to exit relaxation mode during T3
  + SNR2 is set as same as SNR1 which is higher than the entering threshold~~.~~
  + UE is allowed to send OOS indication based relaxed RLM evaluation during T3.
  + The length of D1 is calculated based on relaxed RLM evaluation period.
* Option 2 does not preclude multiple RS configurations. Option 2 is only applied the first configured RS.

**Issue 2-2-2: RLM OOS test – N310**

* Proposals
  + Option 1: Configure N310 = 2 (QC, vivo, MTK)
    - Option 1a: configure N310 = 2 in OOS test to test UE behavior after exiting power saving mode (QC)
    - Option 1b: Configure N310 = 2 to validate whether UE is able to fall back to normal mode when it has send out-of-sync to higher layers. (vivo)
  + Option 2: Use N310 = 1 in test cases. (CATT, CMCC)
* Recommended WF
  + Discuss proposals.

**Topic #1: RRM core requirement maintenance**

**--------------------------------- RAN2 LS --------------------------------------**

**1. Overall Description:**

*RAN2 would like to thank RAN4 for the Reply LS to RAN2 on RLM/BFD relaxation for ePowSav. Based on further RAN4 progress, RAN2 discussed the signaling for RLM/BFD relaxation, and achieved the following agreements:*

|  |
| --- |
| * *Keep the current configuration for serving cell quality criterion as per-serving cell basis in RRC specification.**More specifically, this means that the goodServingCell threshold for BFD can be configured per serving cell, and for RLM can be configured per SpCell.* |

*RAN2 would like to check with RAN4 whether you have any concern.*

*Besides, for low mobility criterion, RAN2 also made the following agreements:*

|  |
| --- |
| * *For low mobility criterion, reuse the values of Rel-16 s-SearchDeltaP and t-SearchDeltaP for Rel-17 s-SearchDeltaP-Connected and t-SearchDeltaPConnected, respectively.* * *MN informs SN when low mobility criterion has been configured in NR PCell. How to capture it could be further discussed in CR (assume impact to TS38.331 and TS37.340)* * *For the R17 low mobility criterion, the UE considers the relaxed measurement criterion is fulfilled only when the defined criterion formula is fulfilled for a period of TSearchDeltaP-Connected. (Assume this is consistent with RAN4 decisions).* * *Capture TSearchDeltaP-Connected for low mobility criterion in RAN2 specification (as long as this does not contradict R4).* |

**2. Actions:**

**To RAN WG4**

*RAN2 kindly request RAN4 to take the above information into account during the following work, and provide feedback, if any.*

**--------------------------------- RAN2 LS --------------------------------------**

**Issue 1-1: Clarifications for Low mobility criteria evaluation**

*Background:* in the incoming LS R2-2206675, Reply LS to RAN4 on RLM/BFD relaxation, RAN2:

|  |
| --- |
| * MN informs SN when low mobility criterion has been configured in NR PCell. How to capture it could be further discussed in CR (assume impact to TS38.331 and TS37.340) |

* Proposals
  + Option 1: keep the previous agreement that evaluate low mobility criteria on PCell. (CATT, vivo, MTK)
  + Option 2: We are fine with network could also configure the low mobility criteria in PSCell. (CMCC)
    - If the low mobility criterion is configured only on the PCell
      * UE should evaluate the low mobility criterion on the PCell, and apply the evaluated low mobility state in both MCG and SCG.
    - If the low mobility criterion is configured on the PCell and PSCell
      * UE should evaluate the low mobility criterion on the PCell and PSCell respectively, and apply the evaluated low mobility state in the corresponding cell group.
  + Option 3 (Ericsson)
    - In NR-DC, the UE configured with low mobility criteria evaluates the low mobility criterion only on SpCell.
    - In NR-DC, if the relaxed measurement criterion (low mobility criteria) is met on a SpCell then the UE assumes that the relaxation criterion is met on all serving cells in the CG of that SpCell.
* Recommended WF
  + Option 1 is aligned with RAN2 LS in Moderator’s understanding.

**Issue 1-7: Reply LS on how to capture TSearchDeltaP-Connected**

* Background: in the incoming LS R2-2206675, TSearchDeltaP-Connected has be mentioned.
* Proposals
  + Option 1: RAN4 has no concern on goodServingCell criterion for BFD can be configured per serving cell, and for RLM can be configured per SpCell. (MTK)
    - RAN4 has already captured in the spec TS38.133 that UE shall consider the low mobility criterion is fulfilled only when the defined criterion formula is fulfilled for a period of TSearchDeltaP-Connected. There is no need to further modify the RAN2 spec.
  + Option 2: Prefer to capture the period TSearchDeltaP-Connected for determining low mobility scenario in RAN2 spec. RAN4 remove this part in TS 38.133 and feed back the decision to RAN2. (vivo)
    - Reply LS draft provided in R4-2212661
* Recommended WF
  + Discuss the two options in the 1st round.
  + The corresponding Reply LS will be discussed in the 2nd round

**Issue 1-2: Introduce minimum requirement at transitions**

*Issue description:* whether to define the minimum requirement at transitions between relaxed and non-relaxed RLM/BFD measurements for OOS evaluation.

* Proposals
  + Option 1: No requirements are specified for transitions between relaxed and non-relaxed RLM/BFD measurements. (QC, Ericsson, MTK)
  + Option 2: Define the minimum requirement at transitions between relaxed and non-relaxed RLM/BFD measurements. (Nokia)
  + Option 2a: For the RLM/BFD measurement, when UE is changed from non-relaxed mode to relaxed mode or from relaxed mode to non-relaxed mode, UE shall use the evaluation period of non-relaxed mode at transitions period (CATT)
* Recommended WF
  + Discuss proposals.

9.13 NR Sidelink enhancement

9.13.5 Moderator summary and conclusions

**[104-e][217] NR\_SL\_enh\_RRM, AI 9.13.3, 9.13.4 – Yoonoh Yang**

**R4-2214137 Email Discussion Summary for [104-e][217] NR\_SL\_enh\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214269**

**R4-2214269 Email Discussion Summary for [104-e][217] NR\_SL\_enh\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2212193 |  | Big CR for SL enhancement RRM test cases | LG Electronics | Email approval | Big CR  Based on the endorsed Big CR based on the last meeting |
| R4-2212411 | R4-2214589 | Maintenance CR for Rel-17 SL on 38.133 | MediaTek inc. | Agreeable | CR |
| R4-2212412 |  | Draft CR on test case for initiation/cease SLSS transmisions in SL-DRX mode | MediaTek inc. | Postponed | Draft CR |
| R4-2212413 |  | Draft CR on test cases for Selection or Reselection of V2X SyncRef Source under SL-DRX | MediaTek inc. | Postponed | Draft CR |
| R4-2213055 |  | Draft CR to TS 38.133: Introduction of test cases for Selection/Reselection of V2X SyncRef Source under SL-DRX | vivo | Not pursued | Draft CR  Because already merged to Big CR(R4-2212412) |
| R4-2213479 | R4-2214630 | CR on maintaining RRM core requirements for R17 NR SL | Huawei, HiSilicon | Agreeable | CR |
| R4-2213480 |  | DraftCR on test cases for initiation/cease SLSS transmisions in SL-DRX mode | Huawei, HiSilicon | Not pursued | Draft CR  Because already merged to Big CR(R4-2212412) |

**GTW on Aug-15**

**Sub-topic 1-1 : Interruption on SL due to Uu BWP switch (12.7.6)**

**Issue 1-1-1: Whether FDM based requirement applies also to TDM based intra-band concurrent SL & Uu operation for interruption on the SL due to BWP switch.**

* Proposals
  + Option 1: Apply (MTK)
  + Option 2 : Not apply
* Recommended WF
  + Moderator’s view
    - Based on companies’ views, make a decision.
    - If no consensus, recommendation is to keep the current status.

**Discussions:**

Mediatek: UE may use the same RF chain for Uu and SL. UE is assumed to use common RF chain for Uu and SL. The interruption will be caused when SL BWP switches.

Qualcomm: this is TDM. In the slot of Uu, there is no SL operation. It should address the concern of Mediatek.

LGE: we have the same view as Qualcomm. TDM has no concurrent operation of Uu and SL.

Huawei: we also have the same view as Qualcomm. This is TDM.

Mediatek: to Qualcomm, do you mean that there is no SL slot during BWP switching happens on Uu slot. That is some different between two.

Qualcomm: referring to BWP switching delay, your understanding is correct. But delay should be counted as Uu slot.

Mediatek: We can agree with Qualcomm. TO Huawei comment, since SL configuration is different, if interruption always happen to Uu, UE need adjust, it is not reasonable.

**Agreement:**

* No sidelink communication happens during Uu BWP switching delay period for TDM based intra-band concurrent SL & Uu operation.

**Issue 1-1-2: To avoid the impact on BWP switch delay for TDM based intra-band concurrent SL & Uu operation, whether to allow for UE to drop SL transmission during BWP switch delay.**

* Proposals
  + Option 1: Allow (MTK)
  + Option 2 : Not allow
* Recommended WF
  + Moderator’s view
    - Based on companies’ views, make a decision.
    - If no consensus, recommendation is to keep the current status.

**Sub-topic 1-2 : Scheduling availability of UE switching between NR Uu and NR SL (12.9.2)**

**Issue 1-2: Whether to include both transmission slot and reception slot considering that switching is not limited to only the transmission slot.**

* Proposals
  + Option 1: Consider both transmission slot and reception slot (Huawei)
  + Option 2: Consider only transmission slot (keep current spec)
* Recommended WF
  + Moderator’s view
    - Based on companies’ views, make a decision.
    - If no consensus, recommendation is to keep the current status.

**Discussions:**

Huawei: option 1 is based on RF spec. In 38.101 the switching between Uu slot and SL slot is defined. In 38.133 we should follow.

LGE: RF spec is capturing the figure. It is time mask.

Vivo: the requirement is about the transmitted requirement. It is used for On-off and time mask. At least it is fine to consider the SL slot. In the current spec it is read transmission slot. For Uu it has to be transmit slot.

Qualcomm: Option 1 can be upaded.

**Agreement:**

* For scheduling availability of UE switching between NR Uu and NR SL, consider SL transmission slot and SL reception slot, and Uu uplink slot.

9.14 Extending current NR operation to 71GHz

9.14.9 Moderator summary and conclusions

**[104-e][218] NR\_ext\_to\_71GHz\_RRM\_1, AI 9.14.6 – Zhongyi Shen**

**R4-2214138 Email Discussion Summary for [104-e][218] 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: Revised to R4-2214270**

**R4-2214270 Email Discussion Summary for [104-e][218] 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: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214476  R4-2215159 | WF on NR extension to 71 GHz RRM requirements (Part 1)WF on … | Huawei, HiSilicon | Agreeable |
| R4-2214477 | LS reply on TCI assumption for RSSI measurement for FR2-2on … | Apple | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211875 | R4-2215146 | Draft CR on UE timing advance adjustment accuracy for Rel-17 NR extension to 71GHz | Apple | Agreeable |  |
| R4-2212216 | R4-2214577 | CR on QCL-ed assumption for RSSI measurement in FR2-2 | LG Electronics Inc. | Agreeable | Capture QCL assumptions for RSSI measurement |
| R4-2212390 | R4-2214584 | CR on Intra-frequency measurement requirements with CCA in FR2-2 | Nokia, Nokia Shanghai Bell | Agreeable | Changes on RSSI QCL assumption will be merged into R4-2212216 |
| R4-2212403 | R4-2214588 | CR on TS38.133 RRM requirements in FR2-2 | MediaTek inc. | Agreeable | Changes on RSSI QCL assumption will be merged into R4-2212216 |
| R4-2212682 | R4-2214971 | Draft CR Measurement procedure updates for FR2-2 | Nokia, Nokia Shanghai Bell | Agreeable | Merge the changes on clause 9 in R4-2213025 |
| R4-2212899 |  | Draft CR Timing RRM requirements for FR2-2 | Ericsson | Merged | Be merged into R4-2214078 |
| R4-2212957 | R4-2214982 | Draft CR on beam sweeping factor for RRM requirements of FR2-2 | Huawei, HiSilicon | Agreeable | Capture comments in 1st round |
| R4-2212958 |  | Draft CR on timing requirements of FR2-2 | Huawei, HiSilicon | Merged | Be merged into R4-2214078 |
| R4-2212960 | R4-2214983 | R4-2212960 | Huawei, HiSilicon | Agreeable | Changes on RSSI QCL assumption will be merged into R4-2212216 |
| R4-2213025 | R4-2214612 | CR on introduction of cell Re-selection, inter-frequency and intra-frequency measurments requirements for FR2-2 | vivo | Agreeable | Capture changes in clause 4. Changes on clause 9 will be merged into R4-2212682 |
| R4-2214077 |  | Draft CR for RSSI measurements for FR2-2 | Qualcomm Incorporated | Merged | Be merged into R4-2212216 |
| R4-2214215  (revised from R4-2212214) |  | LS on Rx beam sweeping factor for RRM measurements | LG Electronics Inc. | Agreeable |  |
| R4-2214078 | R4-2215104 | Draft CR for timing requirements for FR2-2 – MRTD-MTTD | Qualcomm Incorporated | Agreeable | Capture changes on MTTD and MRTD |

**GTW on Aug-18**

**Sub-topic 1-2 QCL-ed assumption for RSSI**

**Background:** A LS is sent from RAN1 (R1-2205582) about QCL-ed assumption for RSSI measurement in FR2-2, and text proposals are provided for infra-frequency/inter-frequency RSSI measurement. Based on submitted contributions in this meeting (R4-2212215/ R4-2212402/ R4-2212956/ R4-2213351/ R4-2212911/ R4-2211879), companies mainly have concerns on the inter-frequency case where the TCI determination seems not clear from RAN1’s LS. The discussion is divided into infra-frequency and inter-frequency. LS can be triggered to other working group if necessary.

**Issue 1-2-1: Intra-frequency QCL-ed assumption**

* Proposals
  + Option 1: Original TP in RAN1 LS (Nokia, Huawei)

*For performing RSSI measurement in FR2-2, UE can assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration. If no TCI state is provided in the RMTC configuration, UE can assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of the current carrier.*

* + Option 2: Minor changes in wording (R4-2212402)

*For performing RSSI measurement in FR2-2, UE* shall *assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration. If no TCI state is provided in the RMTC configuration, UE* shall *assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of* the serving cell on the current carrier ~~in FR2-2~~*.*

* Recommended WF
  + The situation is clear for intra-frequency RSSI measurement. Companies please check whether the original TP or updated TP can be agreeable.

**Discussions:**

Qualcomm: Option 1 is more clear. Serving cell is not clear. Carrier is more clear. Which serving cell are we using?

Vivo: we have a bit different understanding from Qualcomm. BWP is associated with serving cell rather than carrier. RMTC is configured based on other carrier and frequency. It is carrier. BWP is for serving cell. We suggest change orginial workding.

Huawei: confused by Vivo comment. What is “a serving cell” There is no ambiguity about what the serving cell is.

LGE: prefer option 1, which is clear.

Mediatek: support option 2. We need calrify the reference TCI in FR2-2. Active BWP is configured by serving cell.

Vivo: One is only one serving cell. It could be multiple serving cells on the carier.

Apple: the original wording is quite good. The serving cell is equavelent to carrier. Carrier is used for RRM. On the current carrier is redundant.

Ericsson: Support option 2. We suggest to use exclusive definition to use FR2-2 to avoid the ambiguity.

Mediatek: we need FR2-2.

LGE: it is QCLed D, which is only for FR2-2.

Nokia: agree with LGE. If it is redundant.

Ericsson: QCL-D is only for FR2-2. If the serving cell is FR2-1, there is ambiguity.

LGE: FR2-1+FR2-2 is out of scope.

**Agreement:**

* For performing intra-frequency RSSI measurement in FR2-2, UE ~~can~~shall assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration. If no TCI state is provided in the RMTC configuration, UE ~~can~~shall assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of the current carrier in FR2-2.

**Issue 1-2-2: Inter-frequency QCL-ed assumption**

* Sub-issue 1: Reference serving cell when the TCI state is provided in the RMTC configuration
  + Option 1: The QCL reference serving cell is determined by serving cell ID indicated in TCI-StateInfo in RMTC-Config. (Ericsson)
* Recommended WF
  + Based on contributions (R4-2212215/R4-2212402/R4-2213351), “carrier on which the RMTC configuration is provided” is not clear and the corresponding part is redundant. Companies please check whether option 1 is the common understanding.

**Discussions:**

Huawei: we need high level agreement.

**Agreement:**

* The QCL reference serving cell is determined by serving cell ID indicated in TCI-StateInfo in RMTC-Config, when the TCI state is provided in the RMTC configuration.
* Sub-issue 2: When the TCI state is provided in the RMTC configuration
  + Option 1: Original TP in RAN1 LS (Nokia, Huawei)
  + Option 2: (MTK, LGE, vivo)

*or performing inter-frequency RSSI measurement in FR2-2, UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration ~~of the inter-frequency RSSI measurement~~.*

* Recommended WF
  + If Option 1 in Sub-issue 1 is the common understanding, please check whether TP in option 2 is agreeable.

**Discussions:**

Ericsson: OK with Option 2.

Qualcomm: if it is not confined, what should we use as reference for TCI? It should be based on active BWP for active carrier in FR2-2.

Vivo: your comment is discussed under sub-issue 3.

LGE: to Qualcomm, the condition of confine is for inter-frequency measurement. We follow the first bullet.

Qualcomm: if FR1+FR2-2, FR1 measures the resource of FR2-2. Can we use it as reference?

Nokia: the TCI state is provided in RMTC. There is no ambiguity.

Huawei: we are talking about interference. By definition, the resource is not confined in any serving cell.

LGE: for FR1+FR2-2 case we can discuss in sub-issue 4.

Apple: for this issue, we are talking about interference measurement and TCI state is provided in RMTC.

**Agreement:**

* For performing inter-frequency RSSI measurement in FR2-2,
  + if the TCI state is provided in RMTC configuration of FR2-2, UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration.
  + FFS on the following bullet
    - if no TCI state is provided in the RMTC configuration [or if TCI state is only provided in the RMTC configuration on a non FR2-2 carrier] UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of [a or the] carrier in FR2-2. ~~on which the RMTC configuration is provided~~
* **Sub-issue 3: When the TCI state is not provided in the RMTC configuration**
  + Option 1: Original TP in RAN1 LS (Nokia, Huawei)
  + Option 2: (MTK)

If no TCI state is provided in the RMTC configuration of the inter-frequency RSSI measurement, UE shall assume that the measurement resources are QCL-ed with TypeD to the DL RS associated with the TCI state provided in the RMTC configuration on the same FR2-2 band as the inter-frequency RSSI measurement.

If no TCI state is provided in any of RMTC configuration on the same FR2-2 band, UE shall assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of a serving cell on the same FR2-2 band.

* + Option 3 (Qualcomm)

*If no TCI state is provided in the RMTC configuration or if TCI state is provided in the RMTC configuration on a non FR2-2 carrier and the configured RSSI measurement resources are not confined within the bandwidth of any serving cell UE can assume the configured RSSI measurement resources are QCL-ed with TypeD to one of the latest received PDSCH and the latest monitored CORESET in the active BWP of a carrier in FR2-2 ~~on which the RMTC configuration is provided~~*

* Recommended WF
  + Companies please check whether option 2 is agreeable for the case when TCI is not proved in RMTC.

**Discussions:**

LGE: prefer to keep the original TP. For option 2, we can further consider test case. Starting point is option 1.

Apple: for first paragraph, we do not fully understand.

Mediatek: this case is one carrier where TCI state is not provided and TCI is provided by another carrer.

Apple: we should make it clear.

Qualcomm: we provide the alternative sentence.

Huawei: Option 3 is similar as the second paragraph as Option 2.

Vivo: Carrier in FR2-2 is not clear to me.

* **Sub-issue 4: Whether further clarifications are needed from RAN1**
  + Proposal 1: (Apple)

Case 1) If a UE has serving cell in FR2-1 but no serving cell in FR2-2, it is not clear if the UE should use the beam in FR2-1 for FR2-2 RSSI measurement. If so, there still could be some implementation difficulties to “use the beam in FR2-1” since the UE antenna panel for FR2-1 and FR2-2 may have different configurations in terms of the number of antenna elements per panel and panel location in the UE, and thus it may not always be possible to keep the QCL type-D relation. In this case, should UE be allowed to conduct beam sweeping?

Case 2) If a UE has no serving cell in FR2-1 or FR2-2, it is not clear if that explicit TCI state should be configured to the UE for FR2-2 RSSI measurement. If explicit TCI state should be configured, how does the UE use such explicit TCI? In our understanding, there are two options:

* + - Option 1: UE performs RX beam sweeping first on the TCI state associated RS. Once the RX beam is determined, UE performs RSSI measurement and reports it.
    - Option 2: UE performs RSSI measurement by using Rx beam sweeping, and determines which RSSI measurement to report. For example, the UE can report the RSSI measurement results based on the strongest Rx beam (i.e., with highest RSSI value). The beauty of this option is it combines beam sweeping and RSSI measurement in the same procedure and hence may save time in measurement.
* Recommended WF
  + Discuss the cases in proposal 1. As the question in proposal 1 is related to the sub-issue 1/2/3, companies please check whether consensus can be reached in sub-issue 1/2/3 which may eliminate the ambiguity in above proposal 1.

**Discussions:**

Apple: Case 1 is not the valid case.

LGE: does RAN1 or RAN4 discuss this?

**Agreement:**

* RAN4 to clarify the the case with RAN1 when there is no serving cell in FR2-2.
  + If a UE has no serving cell in FR2-2, it is not clear if that explicit TCI state should be configured to the UE for FR2-2 RSSI measurement. If explicit TCI state should be configured, how does the UE use such explicit TCI?

**Sub-topic 1-3 Cell detection relaxation**

**Issue 1-3-1: Cell detection relaxation**

* Proposals
  + Option 1: Introduce the factor KFR to account for the cell-detection relaxation agreed in RAN4 #103, where: For FR2-1, KFR = 1. For FR2-2: KFR = 1 if the SCS of the SSB of the cell being detected is 120 kHz, KFR = 2 if the SCS of the SSB of the cell being detected is 480 kHz, and KFR = 3 if the SCS of the SSB of the cell being detected is 960 kHz.(Nokia)
  + Option 2: Introduce UE capability on relaxed requirements for cell detection. ( Huawei)
* Recommended WF
  + Discuss above options.

**Sub-topic 1-4 Imapct of beam sweeping factor**

**Issue 1-4-1: LS on extension on *maxNumberRxBeam***

* Proposals
  + Option 1: Inform RAN2 about RAN4 agreement to extend the maximum value of maxNumberRxBeam to 12 for FR2-2.(LGE, Huawei)
* Recommended WF
  + Please LGE provide the capability table in this thread and also in A.7 Rel-17 feature list. It is expected to have a stable version in the first week which could be included in the LS of feature list to RAN2.

Based on moderator suggestion, we provide the capability table below, and we will also add the table in feature list thread before end of 1st round.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between UEs (V2X WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type**  **(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| 15. NR\_ext\_to\_71GHz | 15-x | Support of extended maxNumberRxBeam for FR2-2 | Recommended CSI-RS resource repetition number per resource set. The candidate value set is {2,3,4,5,6,7,8,9,10,11,12} |  | Yes | No |  | Per band | N/A | Applicable to FR2-2 only | N/A |  | Mandatory with capability signalling |

**Agreement:**

* Inform RAN2 and RAN1 about RAN4 agreement to extend the maximum value of maxNumberRxBeam to 12 for FR2-2.
* The revised LS R4-2212214 is agreeable.

**GTW on Aug-25**

**Issue 1-1-1: Frame boundary alignment tolerance of PDSCH symbols when deriveSSB-IndexFromCell is disabled**

* Proposals
  + Option 1: Frame boundary alignment tolerance of PDSCH symbols shall be 6 for the combination of 960kHz SSB SCS and 960kHz Data SCS when deriveSSB-IndexFromCell is disabled.
  + Option 2: Frame boundary alignment tolerance of PDSCH symbols shall be 7 for the combination of 960kHz SSB SCS and 960kHz Data SCS when deriveSSB-IndexFromCell is disabled.

**Discussions:**

Qualcomm: 6 comes from the fact the delay is based on certain condition and we had agreed on the delay for other SCS. If we go to 7, it is too large for the UE to have hypothesis testing. We support option 1.

Vivo: we also support option 1. If we change to 7 samples, we need also to modify the 480khz case.

Ericsson: option 2 suggests a higher capability than option 1. We can compromise to option 1.

**Issue 2-1-1: Timing Advance adjustment accuracy**

* Option 1:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| UL Sub Carrier Spacing(kHz) | 15 | 30 | 60 | 120 | 480 | 960 |
| UE Timing Advance adjustment accuracy | ±256 Tc | ±256 Tc | ±128 Tc | ±32 Tc | **[±12 Tc]** | **[±8 Tc]** |

* Option 2:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| UL Sub Carrier Spacing(kHz) | 15 | 30 | 60 | 120 | 480 | 960 |
| UE Timing Advance adjustment accuracy | ±256 Tc | ±256 Tc | ±128 Tc | ±32 Tc | **[±8 Tc]** | **[±4 Tc]** |

* Option 3:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| UL Sub Carrier Spacing(kHz) | 15 | 30 | 60 | 120 | 480 | 960 |
| UE Timing Advance adjustment accuracy | ±256 Tc | ±256 Tc | ±128 Tc | ±32 Tc | **±10 Tc** | **±6 Tc** |

**Discussions:**

Nokia: this has been brought up for some time. Our preference is still option 2. We didn’t see too much justification on option 1. This option 2 was more common sense so we can keep ul timing controlable.

Ericsson: we agree with Nokia for Option 2 since it is the previous agreements. The delay spread is so thin that there is no margin if we go with something like option 1. There is nothing left for gNB. We need every Tc we can find.

Apple: to clarify option 2 is not the agreement. We already agreed on considering the UE implementation challenge. That is the reason we compromised to the tentative agreement. We have provided analysis based on our implementation and we see no compromise from the other camp.

Nokia: regarding the history, it is all connected to Te and TA accuracy. We had provided deep analysis for the Te requirements considering the implementation. We had to compromise even to go beyond the limit of Te.

Apple: we can further compromise so that we can move forward. We have talked so much on the reasons and arguments. We never tightened the BS sync accuracy. Let’s progress.

Ericsson: though 10Tc for 480kHz looks better but we still prefer option 2.

Nokia: we still think option 2 makes better sense.

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**[104-e][219] NR\_ext\_to\_71GHz\_RRM\_2, AI 9.14.7 – Prashant Sharma**

**R4-2214139 Email Discussion Summary for [104-e][219] 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: Revised to R4-2214271**

**R4-2214271 Email Discussion Summary for [104-e][219] 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: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214478 | WF on NR extension to 71 GHz RRM performance requirements | Qualcomm | Agreeable |
| R4-2214479 | Test cases and work split for NR extension to 71 GHz RRM performance requirements | Qualcomm | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2212962 | R4-2214984 | Draft CR on test cases of HO for FR2-2 | Huawei | Agreeable |  |
| R4-2212963 | R4-2214985 | Draft CR on test cases of timing requirements for FR2-2 | Huawei | Agreeable |  |
| R4-2212964 | R4-2214986 | Draft CR on test cases of BWP switch for FR2-2 | Huawei | Agreeable |  |
| R4-2213027 |  | Draft CR on introduction of SSB configurations for FR2-2 | Vivo | Agreeable |  |
| R4-2213028 | R4-2214997 | Draft CR on introduction of intra-frequency and inter-frequency measurement test cases without CCA for FR2-2 | Vivo | Agreeable |  |
| R4-2213347 | R4-2215046 | Draft CR on Test Cases for cell re-selection for extending NR operation to 71GHz | Ericsson | Agreeable |  |
| R4-2213348 | R4-2215047 | Draft CR on Test Cases for SCell activation to 71GHz | Ericsson | Agreeable |  |

**GTW on Aug-18**

**Sub-topic 1-1: Test case structure**

**Issue 1-1-1: Test case structure**

* Proposal 1 (Huawei): For licensed operation, create dedicated test cases for FR2-2 in existing sections (A.7)
* Recommended WF
  + Discuss the proposal

**Agreement:**

* For operation in FR2-2 bands without CCA, create dedicated test cases for FR2-2 in existing sections (A.7)
  + FFS on how to modify the test cases for FR2-1.

**Sub-topic 1-2: Test configurations**

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

* Proposal 1-1 (Huawei): Following SCS/BW configurations to be used in test cases for FR2-2
  + 120 kHz, 100 MHz bandwidth
  + 480 kHz, 400 MHz bandwidth
  + 960 kHz, 400 MHz bandwidth
* Proposal 1-2 (Ericsson): Following SCS/BW configurations to be used in test cases for FR2-2
  + 120 kHz, 400 MHz bandwidth
  + 480 kHz, 400 MHz bandwidth
  + 960 kHz, 400 MHz bandwidth
* Proposal 2 (vivo): The test configurations for intra-frequency measurement for FR2-2 should be defined as follows:

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 2 | 960 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

* Proposal 3 (vivo): The test configurations for inter-frequency measurement for FR2-2+FR2-2 should be defined as follows:

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |

* Proposal 4 (vivo): The test configurations for inter-frequency measurement for FR1+FR2-2 should be defined as follows (SA event triggered reporting tests without SSB index reading):

|  |  |  |
| --- | --- | --- |
| **Config** | **Description of serving cell** | **Description of target cell** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 480 kHz SSB SCS, 400 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | | |

* Proposal 5 (vivo): The test configurations for UE transmit timing for FR2-2 should be defined as follows

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR TDD, SSB SCS 960 kHz, data SCS 960 kHz, BW 400 MHz |

* Recommended WF
  + Discuss the proposals individually
  + Discuss whether UE is required to be tested on only one of the supported test configurations (wherever applicable)

**Sub-topic 1-5: CCA aspects**

**Issue 1-5-3: Modelling unavailable SSB/SMTC**

* Proposal 1a (CATT): When considering how to model an unavailable SSB/SMTC group in the test cases for NR extension to 71 GHz, the first concern should be whether to verify the beam sweeping behaviour of the UE
* Proposal 1b (CATT): If beam sweeping behaviour of the UE is to be verified, an unavailable SSB/SMTC group can be modelled as that there is one SSB index directing towards the UE not transmitted by TE in the available SSB/SMTC occasion when UE Rx beam direct towards the TE.
* Proposal 1c (CATT): For test cases where no beam sweeping behaviour of the UE to be verified, an unavailable SSB/SMTC group can be modelled as none of SSB index directing towards the UE is transmitted by TE in N consecutive SSB/SMTC occasions
* Proposal 2 (Nokia, Huawei, Ericsson): 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
* Proposal 2a (Ericsson): Shift SSB index in each N consecutive SSB/SMTC occasions rather than keeping one fixed SSB index
* Recommended WF
  + Discuss the proposals

**Agreement:**

* Agree prospal 2
* FFS on proposal 2a

**Sub-topic 1-4: RRM measurement performance**

**Issue 1-4-1: RSSI measurement accuracy requirements**

* Proposal 1 (Nokia): RAN4 to define accuracy requirements for RSSI measurements with 120 kHz, 480 kHz and 960 kHz.
* Recommended WF
  + Discuss the proposal

**Agreement:**

* Agree propsal 1.
  + FFS whether UE should pass one test or all the tests.

**GTW on Aug-25**

**Sub-topic 1-4-1: RSSI measurement accuracy requirements**

* GTW agreement
  + RAN4 to define accuracy requirements for RSSI measurements with 120 kHz, 480 kHz and 960 kHz
  + FFS whether UE should pass one test or all the tests

**Discussions:**

**Agreement:**

* GTW agreement
  + RAN4 to define accuracy requirements for RSSI measurements with 120 kHz, 480 kHz and 960 kHz
  + UE should pass one test among all the test configurations

9.15 Enhancements to Integrated Access and Backhaul (IAB) for NR

9.15.4 Moderator summary and conclusions

**[104-e][220] NR\_IAB\_enh\_RRM, AI 9.15.3 – Richie Leo**

**R4-2214140 Email Discussion Summary for [104-e][220] NR\_IAB\_enh\_RRM**

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

**Abstract:**

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

**Decision: Withdrawn.**

9.17 Further enhancements on MIMO for NR

9.17.5 Moderator summary and conclusions

**[104-e][221] NR\_feMIMO\_RRM\_1, AI 9.17.2 – Hua Li**

**R4-2214141 Email Discussion Summary for [104-e][221] NR\_feMIMO\_RRM\_1**

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

**Abstract:**

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

**Decision: Revised to R4-2214272**

**R4-2214272 Email Discussion Summary for [104-e][221] NR\_feMIMO\_RRM\_1**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214481 | WF on FeMIMO RRM impact for unified TCI | Intel | Agreeable |
| R4-2214482 | WF on FeMIMO RRM requirements for inter-cell beam management | Huawei | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2211767](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211767.zip) |  | CR to TS38.133 Correction on Rel17 TRP specific CBD requirements | NTT DOCOMO, INC. | Merged |  |
| [R4-2211860](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211860.zip) |  | CR for inter-cell beam management | Apple | Merged |  |
| [R4-2212128](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212128.zip) |  | CR for Update of sharing factor for SSB based L1-RSRP for serving cell and cell with different PCI | Intel | Merged |  |
| [R4-2212521](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212521.zip) |  | CR on scheduling availability for inter cell beam management | MediaTek Inc. | Agreeable |  |
| [R4-2212665](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212665.zip) | R4-2214594 | CR on unified TCI in R17 feMIMO | vivo | Agreeable |  |
| [R4-2212668](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212668.zip) | R4-2214595 | CR on inter-cell beam managements in R17 feMIMO | vivo | Agreeable |  |
| R4-2212689 | R4-2214972 | LS on active TCI state list for UL TCI | Nokia | Agreeable |  |
| [R4-2213171](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213171.zip) | R4-2215029 | Reply LS on SSB measurement for L1-RSRP on inter-cell beam management | Samsung | Agreeable |  |
| [R4-2213172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213172.zip) |  | CR to TS38.133 Corrections on R17 unified TCI state switching requirement | Samsung | Agreeable |  |
| [R4-2213482](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213482.zip) | R4-2214631 | CR on maintaining TCI state switching requirements for R17 unified TCI | Huawei, HiSilicon | Agreeable |  |
| [R4-2213484](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213484.zip) |  | CR on maintaining L1-RSRP measurement requirements for R17 inter-cell BM | Huawei, HiSilicon | Postponed |  |
| [R4-2213486](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213486.zip) | R4-2214632 | CR on maintaining R17 TRP specific BFR requirements | Huawei, HiSilicon | Agreeable |  |
| [R4-2213878](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213878.zip) |  | CR on SFN based RLM and LRP | ZTE Corporation | Agreeable |  |
| [R4-2213888](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213888.zip) |  | Reply LS on SSB measurement for L1-RSRP on inter-cell beam management | ZTE Corporation | Noted |  |
| [R4-2213931](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213931.zip) |  | CR on TRP Specific BFR requirements | Apple | Merged |  |
| [R4-2213940](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213940.zip) | R4-2214647 | CR on unified TCI state switching requirements | Ericsson | Agreeable |  |
| [R4-2213942](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213942.zip) | R4-2214648 | Maintenance CR on inter-cell beam management | Ericsson | Agreeable |  |
| [R4-2213943](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213943.zip) |  | LS to RAN4 on SSB measurement for L1-RSRP on inter-cell beam management | Ericsson | Noted |  |
| [R4-2213945](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213945.zip) |  | CR on corrections for TRP specific BFR | Ericsson | Agreeable |  |

**GTW on Aug-15**

**Topic #2: Rel-17 RRM performance requirements**

---------------------------------- RAN1 LS --------------------------------

***1. Overall Description:***

*In Rel-17 FeMIMO, for inter-cell beam management, RAN1 has agreed to support PDCCH/PDSCH rate matching around the SSBs indicated by ssb-PositionsInBurst-r17 for the same PCI as that associated with TCI state of the PDSCH/PDCCH as working assumption.*

***Working assumption On inter-cell beam management, the PDCCH /PDSCH should be rate matched around the SSBs indicated by ssb-PositionsInBurst-r17 for the same PCI as that associated with TCI state of the PDSCH /PDCCH***

* ***Send LS to RAN4 on whether there is requirements in RAN4 that assumes UE to measure SSB for L1-RSRP measurement and receiving PDSCH /PDCCH on the same RE in FR1. Revisit this issue after there is RAN4 feedback.***

*RAN1 would kindly like to ask RAN4 to provide feedback on whether there are any requirements that are related to UE measurements of L1-RSRP and reception of PDSCH/PDCCH on the same RE in FR1 for inter-cell beam management. RAN1 would revisit this issue when there is RAN4 feedback.*

***2. Actions:***

***To RAN4 group.***

***ACTION:*** *RAN1 would kindly like to ask RAN4 to provide feedback on whether there are any requirements that are related to UE measurements of L1-RSRP and reception of PDSCH/PDCCH on the same RE in FR1 for inter-cell beam management.*

---------------------------------- RAN1 LS --------------------------------

**Issue 2-6-1: Whether there is scheduling restriction in RAN4 when SSB and PDCCH/PDSCH are overlapped on the same RE**

* Proposals:
  + Proposal 1: No restrictions are introduced in FR1 except for the case when SSB and PDCCH/PDSCH SCS are different, and UE doesn’t support *simultaneousRxDataSSB-DiffNumerology*.
* Recommended WF
  + Please company to check whether proposal 1 is common understanding of RAN4. if yes, RAN4 may need to further discuss issue 2-6-2 before sending reply LS.

**Discussions:**

Qualcomm: we are talking about SSB from neighour cell and try to receive PDCCH from serving cell, right?

Moderator: yes.

Mediatek: SSB and data channel cannot be transmitted in the same RE. If SSB and data channel are transmitted in the same RE, the performance will be degraded.

Apple: The scheduling restriction is the same as requirement for serving cell. We have restriction for the case where the SCSs are different. RAN1 has defined the rate matching. We do not introduction any restriction. RAN1 has rate matching in place.

Ericsson: We have different understanding on the scearion. Neighbour has different PCI. Could you clarify the scenario?

Vivo: It is RAN1 issue for the overlapping on the same RE. There is no overlapping for SSB and PDCCH on the same RE.

Intel: to Ericsson, RAN1 has the agreement that SSB and PDCCH won’t be overlapped. SSB and data are from different PCIs. In RAN4, we have no restriction on the scenario for the same PCI. From RAN4 perspective, proposal 1 is valid. To MTK, the performance will be degraded, which can be discussed later. We would like to discuss if RAN4 needs the requirement for this scenario.

ZTE: we are fine with Proposal 1. The scheduling restriction focuses on the scenario where SSB overlappes with PDSCH/PDCCH on the same symbol. Rate matching belongs to RAN1 scope.

Huawei: We share the same view as Apple and Intel. RAN4 has no restriction requirement for overlapping on the same RE case. It is RAN1 issue.

CMCC: for scenario, according to our understanding, the scenario in LS is about the same PCI. SSB and PDCCH from different PCIs are not considered in LS.

Nokia: we share the same view that the same PCI scenario is to be addressed. Propsoal 1 is OK.

Mediatek: Our understanding is that the current spec is for SSB and PDCCH exist in the same symbol not same RE.

Qualcomm: if we are talking about the same PCI, what exactly the scenario is? Can gNB transmit the two signals at the same time.?

Ericsson: share the same understanding as Nokia and CMCC. SSB and PDCCH/PDSCH are transmitted from the same PCI.

Intel: RAN1 working assumption is for the inter-cell beam management.

Samsung: We have the same understanding as Intel and support the proposal 1.

Apple: Same as Intel. The scenario is for the case where SSB and PDCCH/PDSCH are sent from different PCIs.

Vivo: In previous release, RAN4 does not assume reception of SSB and PDCCH/PDSCH at the same time.

**Chair =>** Need alignment of the views on the scenario to be discussed.

**Issue 2-6-2: Whether any clarification or update is needed in RAN4 spec when SSB and PDCCH/PDSCH are overlapped on the same RE**

* Proposals:
  + Proposal 1: No. Just inform RAN1 about the current status in RAN4.
  + Proposal 2: Clarify that performance degradation is expected when overlapping happen in RAN4.
  + Proposal 3: Clarify that there is no UE requirement when overlapping happen in RAN4.
  + Proposal 4: Define scheduling restriction to avoid overlap between SSB and data on the same RE in RAN4.
* Recommended WF
  + Collect companies’ view for these proposals in 1st round

If the time still allow, we can further discuss issue 1-4-1.

**Topic #1: Maintenance of Rel-17 RRM core requirements**

**Issue 1-4-1 Whether to consider unknown TCI state in the active TCI state list**

* Proposals
  + Proposal 1(vivo, Nokia, Ericsson, ZTE):
    - Yes
  + Proposal 2(MTK):
    - No
  + Proposal 3(Apple, Intel):
    - Don’ t consider unknown TCI state. Longer delay applies if any TCI state is unknown in TCI state list update.
* Recommended WF
  + Collect companies’ view for these proposals in 1st round

**Discussions:**

Mediatek: we can agree with Proposal 3.

Ericsson: In Rel-17 UE can connect to more than two. If we agreed proposal 3, we need define the exact number of delay. From UE complexity point of view, we do not think anything more UE need to do.

Huawei: we can agree with proposal 3. We do not define the exact number.

Samsung: unknown TCI and known TCI are RAN4 concept. RAN1 does not preclude the other possibility. We do not think we have certain answer to the question. We support proposal 3. RAN4 does not define the requirement for TCI stat list update.

Vivo: network may configure TCI state without UE L1-RSRP report. We can compromise to Proposal 3.

Apple: RAN4 cover DCI based TCI switch. It is the fast switch. That the intention to introduce such TCI switching requirement. We do not think unknown PCI should be covered.

ZTE: I am not sure about the difference between Proposal 1 and Proposal 3. Proposal 3 seems that RAN4 has no requirement for unknown case.

Nokia: we suggest to go with proposal 1. We agree with Ericsson. I do not see the big work even to define the longer delay.

Samsung: to ZTE, RAN4 does not define the unknow TCI state requirement.

Intel: Support proposal 3.

Ericsson: we do not see the difference between known and unknown TCI.

ZTE: we have the requirements for both known and unknown.

Intel: in the TCI state list update requirement, we only consider unknown case.

Ericsson: in multiple TRP case, we do not see the reason that UE…

Apple: we are fine with the compromise on the screen.

**Agreement:**

* [Longer delay applies if any TCI state is unknown in TCI state list update]. Active TCI state list can contains known and unkown TCI states.

**Issue 1-2-1 Joint TCI switching delay requirement**

--------------------- previous agreement ---------------------

*The following was agreed in GTW session in RAN4#101bis-e:*

|  |
| --- |
| * *No extra requirement needed for Joint TCI mode, DL and UL requirements can be applicable independently*   + *Note: it is not expected that UE will be required to make DL reception or UL transmission before UE completes the DL or UL TCI state switching, respectively* |

***In 38.133, for DL TCI state switching,***

*[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.]*

***In 38.133, for UL TCI state switching,***

*[In case of joint TCI state switch, UE is not expected to transmit on UL before UE completes the DL and UL TCI state switch.]*

--------------------- previous agreement ---------------------

* Proposals:
  + Proposal 1(Apple, Intel):
    - Keep the previous clarification for Joint TCI state switch in the specification, i.e.joint TCI state switch UE is not expected to receive on the DL or transmit on the UL until it completes both UL and DL TCI state switch.
  + Proposal 2(vivo):
    - RAN4 to confirm again the understanding of agreements in RAN4 101-bis-e as
    - If when both DL TCI(s) and UL TCI(s) are activated by one MAC CE, or when at least one joint TCI(s) are activated by one MAC CE
    - For DL TCI switching delay requirements, UE is not expected to be able to make DL reception when either DL TCI switching is not finished or UL TCI switching is not finished.
    - For UL TCI switching delay requirements, UE is not expected to be able to make UL transmission, when either DL TCI switching is not finished or UL TCI switching is not finished
  + Proposal 3(Nokia, ZTE):
    - Joint TCI switching delay is regarded as same as a pair of separate DL/UL TCI switching.
    - In case of joint TCI state switch, UE is expected to receive on DL, when UE completes the DL state switch.
    - In case of joint TCI state switch, UE is expected to transmit on UL, when UE completes the UL state switch.
  + Proposal 3a(Ericsson):
    - RAN4 to revise the agreement as “No extra requirement needed for Joint TCI mode, DL and UL requirements can be applicable independently” by removing note.
    - During joint TCI state switch, if DL TCI state switch is completed before UL TCI state switch is completed, HARQ for new DL TCI state transmissions to be transmitted using old TCI state.
* Recommended WF
  + Collect companies’ view for these proposals in 1st round

**Discussions:**

Vivo: CR has been agreed in RAN4#102. Therefore, it is quite time-wasting to further discuss this issue. The harq-feedback can not be transmitted if DL is ready while UL is not.

Nokia: We see the point from Ericsson. The note is not prefect clear. We need clarify the note from the agreement. We have concern about having the harq feedback on the old TCI state.

Mediatek: we share the same view as Vivo. We can keep the current spec as it is. Even though DL TCI state is completed clearly, but ACK/NACK transmission is not stable if UL is not swichted completely.

ZTE: we agree with Ericsson. The note is not very clear. For the concern from Vivo, we believe Proposal 3a provides the solution.

Apple: for joint TCI state, the intention is for UE to swtich DL and UL together. We do not think 3a is valid solution.

Vivo: we share the same view as Apple.

Nokia: we can keep the previous agreement and work on the CRs.

Intel: We can keep the previous agreement. For DL, it needs the uplink feedback. We should consider them together.

**Chair => keep the prevous agreement and further work on the CR to further clarify the following wordings in the CR:**

* ***In 38.133, for DL TCI state switching,***
  + *[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.]*
* ***In 38.133, for UL TCI state switching,***
  + *[In case of joint TCI state switch, UE is not expected to transmit on UL before UE completes the DL and UL TCI state switch.]*

**Issue1-1-1 Whether UE need to track UL time/frequency for DL-RS associated with active UL TCI state**

* Proposals:
  + Proposal 1(Apple, Intel, Ericsson):
    - UE don’t need to track UL time/frequency for DL-RS associated with active UL TCI state for UL transmission.
  + Proposal 2(MTK):
    - The source RS in active UL TCI state should be subset of source RS in DL TCI state to guarantee the timing of UL TCI state is under tracking.
  + Proposal 3(vivo):
    - RAN4 further discuss whether/how to optimize the case ‘UE might not be able to obtain DL timing of the target TRP when UE is able to transmit UL based on the corresponding UL TCI from the target TRP’ in R17, i.e. whether to further require UE to track time and/or frequency on DL-RS associated with active UL TCI in R17.
  + Proposal 4(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.
  + Proposal 5(ZTE):
    - Option 1: UL timing is derived from current DL timing
    - Option 2: UL TCI state timing is derived from the RS of the UL TCI state.
    - Option 1 is common understanding in general. However referring to the multi-TRP scenario, Option 2 is reasonable since different TRPs for DL and UL is possible. For the case that not any DL timing can be referenced, UE needs to perform time/frequency tracking for target UL TCI state.
* Recommended WF
  + Collect companies’ view for these proposals in 1st round

**Discussions:**

Intel: what is the relation between the active UL TCI state and active DL TCI state? If we agree with this, and if uplink TCI state is within DL TCI state, then proposal 1 can work.

Mediatek: Support proposal 2. We do not consider RS for tracking. The source for UL TCI state should be the subset of DL TCI state, because DL TCI state in TCI list that UE required to track time/frequency for source RS.

ZTE: Proposal 2, 3, 5 share the same concern about how to guarantee the timing/frequency tracking. We wonder if it can be guaranteed if the UL TCI is the subset of DL TCI. Otherwise UE needs to do fine timing/frequency tracking for target.

Apple: UL TCI only indicates the beam rather than indication any other relationship. UE always follows the serving timing for DL transmission.

Nokia: The uplink TCI state should be active DL TCI state. UE is required to track the timing. Our view is the same as ZTE.

Vivo: share the similar view as Mediatek and Apple. It can be solved by network implementation. Network can ensure the relation or send the command.

Huawei: we have the similar view as Apple. UL TCI has no any RS for tracking. We do not need such relationship between UL TCI and DL TCI.

Intel: to question of Apple and Huawei, in legacy we only consider the serving cell. If the uplink TCI state is related to the cell with different TCI.

**GTW on Aug-25**

**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(Intel, Apple, Huawei, Samsung):
    - Longer delay is expected.
  + Proposal 2(MTK, vivo, Ericsson, ZTE, Nokia):
    - Reuse the existing delay requirement of MAC CE based UL TCI state switch.

**Discussions:**

Ericsson: when the PL-RS samples are taken 5 samples when SSB is the RS and the beam sweeping will be delayed. But the UE does not necessarily have to switch the beam since the beam info is already known to the UE.

Huawei: Beam sweeping is always assumed on SSB. We cannot assume the beam is not changed.

MediaTek: we support option 2. The UE is able to schedule the measurements based on the info acquired from beam management.

Samsung: we prefer option 1. UE is assumed to sweep beam continuously. The UE is not able to schedule the measurement without vacant SSB. In some way UE can complete the RX beam sweeping but we need to consider the minimum requirement.

ZTE: the key point is whether additional Rx beam sweeping is necessary. The UE has already determined the Rx beam.

Vivo: we support option 2. PLRS is different that maintenance of it requires only the data beam info.

Intel: implementation issue. Some UE always carry out Rx beam sweeping. For TCI state switch we need to get it done as fast as possible. We need a compromise solution. We propose to reduce the delayed number allowed.

Huawei: maybe we can avoid specifying the exact value but just to say ‘longer delay is expected.’

Nokia: this wording is vague to the network. The performance seems not guaranteed.

Apple: we support Huawei understanding.

Chair proposal:

Option 1: Regarding MAC-CE based UL TCI state switching delay when SSB is indicated as PL-RS in UL TCI state for FR2, additional 5 SSB occasions (regardless of the beam used by the UE) is allowed if the SSB are all contained in the SMTC. If there is SSB outside SMTC, the UE is supposed to use the SSB outside SMTC to carry out PL-RS measurements and no delay is expected.

Option 2: Regarding MAC-CE based UL TCI state switching delay when SSB is indicated as PL-RS in UL TCI state for FR2, longer delay is allowed if the SSB are all contained in the SMTC. If there is SSB outside SMTC, the UE is supposed to use the SSB outside SMTC to carry out PL-RS measurements and no delay is expected.

Option 3: Reuse the existing delay requirement of MAC CE based UL TCI state switch.

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**[104-e][222] NR\_feMIMO\_RRM\_2, AI 9.17.3 – Yiyan Zhang**

**R4-2214142 Email Discussion Summary for [104-e][222] NR\_feMIMO\_RRM\_2**

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

**Abstract:**

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

**Decision: Revised to R4-2214273**

**R4-2214273 Email Discussion Summary for [104-e][222] NR\_feMIMO\_RRM\_2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214483 | WF on FeMIMO RRM Performance Requirement and Test Case | Samsung | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211861 | R4-2214909  R4-2215149 | Draft CR for test case for FeMIMO - Unified TCI state switching for EN-DC in FR2 | Apple | Agreeable |  |
| R4-2211862 | R4-2214910  R4-2215148  R4-2215161 | Draft CR for test case for FeMIMO – TRP specific BFR for NR-SA in FR1 (PCell) | Apple | Agreeable |  |
| R4-2212123 | R4-2214938 | Draft CR about TRP specific Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode | Intel | Agreeable |  |
| R4-2212124 | R4-2214939 | Draft CR about TRP specific Beam Failure Detection and Link Recovery Test for FR2 SCell configured with CSI-based BFD and LR in DRX mode | Intel | Agreeable |  |
| R4-2212518 | R4-2214965 | Draft CR on TC for joint unified TCI state switching in FR2 NR SA\_MediaTek Inc | MediaTek Inc. | Agreeable |  |
| R4-2212669 | R4-2214969 | Draft CR on test case for DL TCI state switching for Cell with different PCI in FR2 NR-SA | vivo | Agreeable |  |
| R4-2212670 | R4-2214970 | Draft CR on test case for L1-RSRP measurement procedure in FR1 NR-SA | vivo | Agreeable |  |
| R4-2212918 | R4-2214980 | Draft CR to TS38.133 TRP BFR performance EN-DC + FR1 + PSCell FR1 | Nokia | Agreeable |  |
| R4-2212919 | R4-2214981 | Draft CR to TS38.133 TRP BFR performance EN-DC + FR1 + PSCell FR2 | Nokia | Agreeable |  |
| R4-2213173 | R4-2215030 | Draft CR to TS38.133 Test case for R17 UL TCI state switching | Samsung | Agreeable |  |
| R4-2213174 |  | Draft CR to TS38.133 RRM test configurations for FeMIMO test | Samsung | To be merged. |  |
| R4-2213488 | R4-2215063 | DraftCR on introducing unified TCI configurations | Huawei, HiSilicon | Agreeable |  |
| R4-2213490 | R4-2215064 | DraftCR on L1-RSRP measurement test for R17 inter-cell beam managements | Huawei, HiSilicon | Agreeable |  |
| R4-2213492 | R4-2215065 | DraftCR on SSB and CSI-RS configurations for TRP specific BFR tests | Huawei, HiSilicon | Agreeable |  |
| R4-2213884 |  | Draft CR on test case for L1-RSRP measurement on a cell with different PCI from serving cell for NR SA in FR1 in TS38.133 A.6.6.x.y | ZTE | To be merged. |  |
| R4-2213885 | R4-2215097 | Draft CR on test case for MAC CE based TCI state switch for a known joint TCI state in FR2 in TS38.133 A7.5.x.y | ZTE Corporation | Agreeable |  |
| R4-2213946 | R4-2215099 | Test case on unified TCI state switching | Ericsson | Agreeable |  |
| R4-2213947 | R4-2215100 | Test case on link recovery procedure per TRP | Ericsson | Agreeable |  |

**GTW on Aug-15**

**Sub-topic 1-2: Test configuration for unified TCI state switching**

**Issue 1-2-1: Pathloss RS in joint TCI test case**

* Proposals
  + Option 1: Configure Pathloss RS in joint TCI case
    - Option 1a: Pathloss RS is maintained
    - Option 1b: Pathloss RS is not maintained
  + Option 2: Do not configure Pathloss RS in joint TCI case
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Discussions:**

Samsung: in last meeting, we do not specify the Pathloss RS configuration or not for the join TCI. Pathloss RS is optional IE. Pathloss RS has been tested in the UL TCI state switching case.

Huawei: we are OK with not to configure Pathloss RS. If we do not configure Pathloss RS, does it means source RS in the joint TCI will be used as pathlosss RS.

Ericsson: Joint TCI state switching supports both UL and DL switching. We could configure Option 1a.

Apple: the joint TCI is configuring the TCI for both UL and DL. We do not understand Option 2. It should be part of configuration. The requirement is based on the pathloss maintained or not maintained. We slightly prefer Option 1a. We can futher discussion whther Pathloss RS is maintained or not maintained.

Samsung: to Huawei and Apple concern, Pathloss RS is optional UL TCI signaling. Pathloss RS is tested in UL TCI switching test case. We do not need to test it again.

Apple: even if it is option IE, why should we not configure it?

Ericsson: How about power control.

Samsung: For this test case, we are testing the joint TCI state switching including UL and DL switching.

Intel: If pathloss is not configured, it means pathloss is associated with TCI state. It is possible not to configure Pathloss RS.

Mediatek: slightly prefer Option 1a.

Vivo: prefer Option 1a. If pathloss is not configured, UE behaviour should be specified in RAN1 and RAN2.

**Issue 1-2-2: Pathloss RS in UL (and joint TCI) test case**

* Proposals
  + Option 1: Use CSI-RS as the Pathloss RS in the test case, and the CSI-RS is QCLed Type-D with the corresponding SSB
    - Option 1a: Reuse existing CSI-RS configuration in 38.133
    - Option 1b: Introduce new configuration of CSI-RS for pathloss RS (Periodic CSI-RS with repetition on)
  + Option 2: Use the same SSB as Pathloss RS
  + Option 3: other solution
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Discussions:**

Huawei: we can go with option 1. But for option 1b, we prefer to use option 1a.

Samsung: we pefer to Option1b. The current CSI-RS configuration, we do not find the proper CSI-RS configuration as Pathloss RS. For Pathloss RS, the CSI-RS should be with repetition on. If no existing configuration can be used, we prefer option 1b.

Apple: we are not sure the entire configuration. We need to check what the issue is. The simply solution is to configure pathloss RS as the same for UL TCI state.

Huawei: To Samsung, for option 1b, we are not sure if repetition on is needed. Huawei provides the CR for the new TCI configuration for DL and UL TCI state switching. We encourage companies to see the configuration.

Mediatek: for these pathloss RS, could it be applied for nonserving cell. Whether CSI-RS could be pathloss RS for non-serving cell.

Huawei: for test cases, UL TCI and joint TCI state switching, it is assume for serving cell. For non-serving cell it is tested in DL TCI state switching.

Apple: we have the same understanding as Huawei. It should be periodic RS but have question on repetition on.

**Agreements:**

* For Pathloss RS in UL (and joint TCI) test case, use CSI-RS as the Pathloss RS in the test case, and the CSI-RS is QCLed Type-D with the corresponding SSB.
* Further discuss the detailed configurations of CSI-RS considering the following options.
  + Option 1a: Reuse existing CSI-RS configuration in 38.133
  + Option 1b: Introduce new configuration of CSI-RS for pathloss RS (Periodic CSI-RS with repetition on)

**Issue 1-2-3: Introduce new unified TCI state configurations**

* Proposals
  + Option 1: Introduce separate DL, UL and joint TCI state configuration in unified TCI configuration section
  + Option 2: Introduce unified TCI state configuration in existing TCI configuration section
  + Option 3: No need for new DL TCI state
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Discussions:**

Huawei: we support Option 1. The test case is different from legacy one.

Moderator: I observe the different writing method about introduction of TCI state configuration. Option 1 is more clear.

Apple: we also support option 1. We have the same view that configuration for unified TCI is different from legacy.

**Agreements:**

* Introduce separate DL, UL and joint TCI state configuration in unified TCI configuration section

**Issue 1-2-4: Data transmission on cell with different PCI in the test case**

* Proposals
  + Option 1: No DL/UL data transmission to cell with different PCI during the test, and measurement only
  + Option 2: DL/UL data transmission to both serving cell and cell with different PCI during the test
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Discussions:**

Moderator: we observe the different test cases. We need to specify whether UE has the data transmission with different PCIs. From our side, we prefer to Option 2. We need check the switching via data transmission.

Huawei: Since the cell with different PCI is used as TRP, there is no need to simulate data transmission from two cells. We can set two different AoA.

Apple: for test cases with different PCI, UE receives data from one cell. After known state is met, UE will receive TCI switch and then UE will receive the data from the other cell. We have only DL TCI swithing not both DL and UL.

Vivo: We do not see big difference between option 1 and option 2. We can simply use the wording from RAN1 spec.

Huawei: this is only for DL TCI state switch.

**Agreements:**

* For DL TCI state switching test case(s), data transmission is based on TCI state which is QCLed with the SSB from cells with different PCIs.

**Issue 1-2-5: Introduce new RS configuration for cell with different PCI in the test case**

* Proposals
  + Option 1: Introduce new TRS and DL TCI state for cell with different PCI in the test case
  + Option 2: No need to introduce more configuration, and reuse existing ones
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Sub-topic 2-1: Test configuration for L1-RSRP measurement on cell with different PCI**

**Issue 2-1-1: Whether configure L1-RSRP on the serving cell in the test case**

* Proposals
  + Option 1: No need to configure L1-RSRP on the serving cell
  + Option 2: Configure L1-RSRP measurement on both serving cell and cell with different PCI
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Discussions:**

Huawei: support option 2. SSB is always configured to be associated with serving cell SSB. It is for inter-cell beam management different PCI should be configured.

Ericsson: we support option 2.

Apple: We would like to understand more about the issue. The test case focuses on testing the L1-RSRP on non-serving cell? Do we need configure L1-RSRP on both serving cell and non-serving cell and test L1-RSRP for cell with different PCI?

Huawei: we do not understand is that both configured with L1-RSRP.

Vivo: prefer Option 2, which is more typical.

Samsung: prefer option 2. For test case, two cells are both configured for L1-RSRP, but we only test the cell with different PCI.

Mediatek: prefer option 2. Test under discussion is beam management. We do not need perform L1-RSRP for serving cell in this test case.

Intel: prefer option 2.

**Agreements:**

* Configure L1-RSRP measurement on both serving cell and cell with different PCI
* For test case, two cells are both configured for L1-RSRP, but we only test the cell with different PCI.

**Issue 2-1-2: SSB configuration for serving cell and cell with different PCI**

* Proposals
  + Option 1: the same period for SSBs from serving cell and cell with different PCI, clarify which PCI the SSB is associated to in the test, and the sharing factor PSC/CDP=2
  + Option 2:Other SSB configurations
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Issue 2-1-3: CP length configuration in the test case**

* Proposals (Timing offset between SSB with different PCI should be within CP)
  + Option 1: Specify the CP length configuration in the test
  + Option 2: No need to specify the CP length configuration
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Issue 2-1-4: AOA setup for tested FR2 cell in the test case**

* Proposals
  + Option 1: AoA setup of FR2 cell for the test case is Setup 1
  + Option 2: AoA setup of FR2 cell for the test case is Setup 3, one AoA is for FR2 serving cell, and another is for cell with different PCI.
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Sub-topic 3-2: Test Configurations for TRP specific BFR**

**Issue 3-2-1: BFD/CBD RS configuration for TRP specific link recovery tests**

* Proposals
  + Option 1: Following the table below and introduce new SSB configurations

**Table 2: BFD/CBD RS configuration for TRP specific link recovery tests**

|  |  |  |
| --- | --- | --- |
| **Resource set** | **SSB based link recovery test** | **CSI-RS based link recovery test** |
| BFD-RS set (q0,0) | SSB#0 | CSI-RS#0 |
| CBD-RS set (q1,0) | SSB#1 | CSI-RS#1 |
| BFD-RS set (q0,1) | SSB#2 | CSI-RS#2 |
| CBD-RS set (q1,1) | SSB#3 | CSI-RS#3 |
| RLM-RS set | SSB#0, SSB#1, SSB#2, SSB#3 | CSI-RS#0, CSI-RS#1, CSI-RS#2, CSI-RS#3 |

* + Option 2: Other RS settings
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Issue 3-2-2: AOA setup in FR2 test**

* Proposals
  + Option 1: Two AoAs are configured in the test, each of which is for one of two TRPs
  + Option 2: other AoA setup
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Issue 3-2-3: Beam failure occurred during the test case**

* Proposals
  + Option 1: For R17 TRP-specific link recovery tests, it is suggested that beam failure occurs on one BFD-RS resource set. SNR level of TRP 2 will always keep at high level.
  + Option 2: Beam failure occurs on both TRPs in the test
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

**Issue 3-2-4: BFR-RS configured for 2 TRPs in the test**

* Proposals
  + Option 1: BFD-RS of two TRPs are overlapped
  + Option 2: Other configuration
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

9.18 Support of reduced capability NR devices

9.18.6 Moderator summary and conclusions

**[104-e][223] NR\_redcap\_RRM\_1, AI 9.18.3, 9.18.3.1, 9.18.4 – Santhan Thangarasa**

**R4-2214143 Email Discussion Summary for** **[104-e][223] NR\_redcap\_RRM\_1**

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

**Abstract:**

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

**Decision: Revised to R4-2214274**

**R4-2214274 Email Discussion Summary for [104-e][223] NR\_redcap\_RRM\_1**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214484 | Reply LS on configuring margin for 1 Rx RedCap UEs | Ericsson | Agreeable |
| R4-2214485 | WF on RedCap RRM requirements | Ericsson | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211692 |  | Draft CR on SSB configurations for FR1 | CATT | Not pursued |  |
| R4-2211694 | R4-2214888 | Draft CR on test case for timing for Redcap UE for FR1 | CATT | Agreeable |  |
| R4-2211696 | R4-2214889 | Draft CR on test case for timing for Redcap UE for FR2 | CATT | Agreeable |  |
| R4-2211973 | R4-2214571 | CR on 4-step random access test in FR1 for RedCap UE | Xiaomi | Agreeable |  |
| R4-2211974 | R4-2214572 | CR on SSB-based RLM in-sync test in FR1 for RedCap UE | Xiaomi | Agreeable |  |
| R4-2211975 | R4-2214573 | CR on 4-step random access test in FR2 for RedCap UE | Xiaomi | Agreeable |  |
| R4-2211976 | R4-2214574 | CR on SSB-based RLM in-sync test in FR2 for RedCap UE | Xiaomi | Agreeable |  |
| R4-2212040 | R4-2214925 | draftCR on test for RRC connection release with redirection to NR redcap | OPPO | Agreeable |  |
| R4-2212041 | R4-2214926 | Draft CR on SA event triggered reporting tests without gap under DRX for 1Rx&2Rx UE for intra-frequency measurement | OPPO | Agreeable |  |
| R4-2212042 | R4-2214927 | Draft CR on SA event triggered reporting tests with per-UE gaps under DRX for 1 Rx UE & 2Rx UE | OPPO | Agreeable |  |
| R4-2212043 | R4-2214928 | Draft CR on SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading for 1 Rx UE & 2Rx UE | OPPO | Agreeable |  |
| R4-2212044 | R4-2214929 | Draft CR on SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1 for 1 Rx UE & 2Rx UE | OPPO | Agreeable |  |
| R4-2212045 | R4-2214930 | Draft CR on SA NR - E-UTRAN event-triggered reporting in DRX in FR1 for 1 Rx UE & 2Rx UE | OPPO | Agreeable |  |
| R4-2212280 | R4-2214580 | CR on carrier-specific scaling factor for RedCap (9.1A.5) | CMCC | Agreeable |  |
| R4-2212391 | R4-2214585 | CR for introduction of RRC connection mobility control test cases in FR1 for RedCap Ues | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212392 | R4-2214586 | CR for introduction of RRC connection mobility control test cases in FR2 for RedCap Ues | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212393 | R4-2214587 | CR on applicability of requirements for RedCap Ues | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212756 |  | draftCR on inter-RAT NR measurement for RedCap | Ericsson | Agreeable |  |
| R4-2212757 | R4-2214597 | draftCR on RedCap RLM | Ericsson | Agreeable |  |
| R4-2212758 | R4-2214598 | draftCR on RedCap measurement | Ericsson | Agreeable |  |
| R4-2212759 | R4-2214599 | Big CR to capture all missed endorsed CRs for TS 36.133. | Ericsson | Agreeable |  |
| R4-2212988 | R4-2214606 | Correction on Ranking for 1RX RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2212990 | R4-2214607 | Correction on Trs definition for RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2212992 |  | Clarification on SSB in RLM and BFD for RedCap UE | Ericsson | Agreeable |  |
| R4-2212994 |  | Correction on measurement requirements for RedCap UE | Huawei, HiSilicon | Not pursued |  |
| R4-2213002 | R4-2214989 | CR on accuracy requirements for Redcap | Huawei, HiSilicon | Agreeable |  |
| R4-2213003 |  | DraftCR: SSB and SMTC configuration for NCD-SSB for RedCap | Huawei, HiSilicon | Not pursued |  |
| R4-2213005 | R4-2214990 | Test case for handover for FR1 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213006 | R4-2214991 | Test case for handover for FR2 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213007 | R4-2214992 | Test case on Out-of-sync Test for FR1 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213008 | R4-2214993 | Test case on Out-of-sync Test for FR2 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213009 | R4-2214994 | Test case on measurement accuracy for FR1 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213010 | R4-2214995 | Test case on measurement accuracy for FR2 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213011 | R4-2214996 | Test case on measurement procedure for FR2 RedCap UE | Huawei, HiSilicon | Agreeable |  |
| R4-2213378 |  | CR on SDT RRM requirements for RedCap Ues | ZTE Wistron Telecom AB | Not Pursued |  |
| R4-2213406 | R4-2214626 | Changes to SDT requirements for NR RedCap | Ericsson | Agreeable |  |
| R4-2213408 | R4-2214627 | Changes to RRC\_IDLE mode requirements for RedCap for TS 38.133 | Ericsson | Agreeable |  |
| R4-2213411 | R4-2215051 | Test case list for RedCap RRM performance part | Ericsson |  | R4-2213411  Agreeable  R4-2215051  withdrawn |
| R4-2213412 | R4-2215052 | Draft CR: IDLE mode test cases for FR1 RedCap | Ericsson | Agreeable |  |
| R4-2213413 | R4-2215053 | Draft CR: IDLE mode test cases for FR2 RedCap | Ericsson | Agreeable |  |
| R4-2213414 |  | Draft CR on side conditions on RRM requirements applicability for RedCap | Ericsson | Agreeable |  |
| R4-2213452 | R4-2215054 | draft CR for test case for SA NR - E-UTRAN handover for Redcap | Vivo | Agreeable |  |
| R4-2213453 | R4-2215055 | draft CR for test case for 2-step random access test in FR1 for NR standalone for Redcap | vivo | Agreeable |  |
| R4-2213454 | R4-2215056 | draft CR for test case for BFD and LR test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode for Redcap | Vivo | Agreeable |  |
| R4-2213455 | R4-2215057 | draft CR for test case for SA event triggered reporting without SSB time index detection when DRX is used for FR1 Redcap | Vivo | Agreeable |  |
| R4-2213456 | R4-2214720 | draft CR for test case for SA event triggered reporting without SSB time index detection when DRX is used for FR1 Redcap | Vivo | Agreeable |  |
| R4-2213457 | R4-2215058 | draft CR for test case for SSB based L1-RSRP measurement for beam reporting for Redcap | Vivo | Agreeable |  |
| R4-2213458 | R4-2215059 | draft CR for test case for 2-step RA type test in FR2 for NR Standalone | Vivo | Agreeable |  |
| R4-2213654 | R4-2215087 | DraftCR on Intra-frequency handover from FR1 to FR1 unknown target cell for 2 and 1 Rx UE | MediaTek inc. | Agreeable |  |
| R4-2213655 | R4-2215088 | DraftCR on NR UE Transmit Timing Test for FR1 for 1 and 2 Rx UE | MediaTek inc. | Agreeable |  |
| R4-2213656 | R4-2214642 | CR on RedCap maintenance in TS 38.133 | MediaTek inc. | Agreeable |  |
| R4-2213752 | R4-2215093 | Draft CR on side conditions on RRM requirements applicability for RedCap | Ericsson | Agreeable |  |
| R4-2214076 |  | Draft CR on timing requirements with measurement gaps for RedCap UEs | Qualcomm Incorporated | Not Pursued |  |

**GTW on Aug-16**

**Sub-topic 6-2: Cell-specific RSRP offset**

**Issue 6-2-1: Applicability of cell-specific RSRP offset**

* Proposals
  + **Option 1 (Ericsson):** RedCap UE with 1 Rx branch should apply the offset to all the cell-specific RSRP thresholds used in RAN2 specifications except those discussed in proposal 2 below.
    - RAN4 does not recommend that the RedCap UE with 1 Rx branch applies the offset to any of the conditions or thresholds used for any relaxed measurement criteria defined in Rel-16 or Rel-17.
  + **Option 1a (Intel):** 
    - Introduce separate offset of offsetRSRPChange, cg-SDT for TA validation of cg-SDT procedure for 1 Rx. RedCap UE in INACTIVE.
    - include *cg-SDT-RSRP-ThresholdSSB* among the candidate of 1 Rx. RSRP absolute configuration margin
    - For 1 Rx. RedCap UE, introduce separate offset of offsetRSRQ and offsetSINR used for *absThreshSS-BlocksConsolidation*.
    - For 1 Rx. RedCap UE, reuse offsetRSRP and offsetRSRQ for *Q-RxLevMin / Q-QualMin* level determination.
  + **Option 2 (Apple, Nokia):** A RedCap UE with 1 Rx branch applies the offset to all cell-specific RSRP thresholds, including the ones used for Rel-16 low mobility and/or not at cell edge conditions, and Rel-17 stationary and not at cell edge conditions for RRC idle/inactive state.
  + **Option 3 (HW):** Not introduce threshold offset in spec and the measurement difference gap between 1Rx and 2RX is up to UE implementation.
  + **Option 4 (MTK):** If RAN4 would like to introduce offset for other RSRP threshold (for all cell-specific RSRP thresholds) then this shall be discussed case by case
  + **Option 5(vivo)**: A configurable offset can be applied to cell (re)selection thresholds.
* Recommended WF
  + Discuss the options.

**Discussons:**

Apple: we support option 2, which was the previous agreement. This offset reflects the difference of 1Rx and 2Rx. We can also compromise to option 3 if there is too much work to do. We can leave it to implementation.

Huawei: We support option 3. Although there is uncertainty, there are some parts which needs be discussed. There would be enomorous work to do. There are many threshold that should be discussed. For some threshold, the positive offset is needed while for others like stationary the negative value needs be set. It is impossible to analyze case by case. If we can focus on L3 evaluation, the difference between 1Rx and 2Rx is just 1dB, which is marginal.

Ericsson: we can compromise to Option 2. We completely disagree with Huawei. The LS was sent to RAN2 to list examples and RAN2 is asking whether it can be applied to all the cell specific RSRP threshold. For 1dB, it is 20dB extended coverage. We have long debate.

CMCC: we think in previous RAN4 meeting we just discussed some of parameters. Regarding RAN2, we are worried about applying the offset to all the threshold. For 2-step rach, we would like to prevent UE to do 2-step. For cell-reselection, we would like to apply the threshold to let UE to camp on the cell stably. We are open to discuss them case by case. We should be careful.

Nokia: the offset is needed. There is accuracy degradation. The same offset may not be applicable to all the cases. We can consider whether the offset is the absolute value. The other issue is whether the threshold is applied in lower SNR and higher SNR. The accuracy is different. In the next issue, we are also open to whether to define the configurable offset.

Intel: our proposal is the same as the approach as Nokia. The work load is heavy. But considering the gain and operation, we can categorize the inputs. Which operation can be benefit from most of gain. Separate offsets can be defined. It is option 1a. I do not agree to apply all the single offset to all the measurement. We can pick some offset to cover some operation.

Vivo: to our understanding, the offset was introduced by RAN4 for some cases. It is applied to some cases with different levels. We do not want to consider all the cases considering just 1dB difference. RAN2 has different understanding on how to apply it. This information we provided to RAN2 may mis-lead RAN2 decision. The better way is to limit to RAN4 and apply it to idle cell selection case.

Qualcomm: offset is needed. We agree with Ericsson. It is needed for some threshold. The offset is needed. We are open to discuss case by case. We can discuss the important cases. The threshold should be fixed number. We just need to have RAN4 spec impacted. We are open to discuss them case by case rather applying the offset to all the cases.

Mediatek: We have similar comment as Qualcomm. We have already agreed that the value should be fixed value.

Ericsson: we have list of threshold of R4-2206951. We can consider them to address the problem. In stead of debate of negative and positive, we can consider configurable. If not agreeable, we can consider case by case.

Huawei: The threshold listed five IE. *rsrp-ThresholdCSI-RS is per UE. msgA-RSRP-Threshold and rsrp-ThresholdBFR* are for 2-step rach. We have concern on configurable which has more impact on RAN2.

Ericsson: some item is per-UE. But RAN2 can solve this. If there is fixed value, RAN2 will give the referent to RAN4 spec 38.133. We can add them in the performance part. This is the way to move forward.

Vivo: the concern is the workload. We just stick to the threshold mentioned in RAN4 LS.

Intel: at least RSRP change threshold, we can consider configurable offset.

Apple: to CMCC, the specifc value in the spec, we need study case by case. We need stick to the previous agreement and we should use the fixed value, which gives UE more flexibility to apply the threshold. To narrow down the case, the case in the LS is too limited. For RRM relaxation criterion, we also need carefully check.

Ericsson: offset should not be different for those five cases. We can give the flexibility to RAN2.

Huawei: for option2, the workload in RAN4 needs be carefully considered. The case-by-case analysis is needed. Could we use the relaxed measurement accuracy to solve the issue.

Nokia: our preference is to do it configurable. If going with fixed one the workload in RAN4 is high.

Qualcomm: we do not agree with the configurable threshold. We should stick to fixed one. It would be different for most cases.

OPPO: We do not prefer to configurable value. We should keep fixed value. We share the concern of the workload is high. We may consider relax the accuracy of 1Rx compared to 2Rx.

Intel: even going with fixed threshold, we need consider RSRP change threshold. The RSRP change threshold, the threshold should be negative value.

Vivo: The threshold is related to coverage. We have reached the agreement. Some threshold needs fixed values. Some threshold is UE specific. There is only one threshold which is related to coverage.

Mediatek: we agree that threshold is related to coverage.

Ericsson: single offset is enough. For intel, some scenario needs negative value. We need to get input from RAN2.

Apple: for single or multiple, we need to do study. Some threshold depends on L3, for which the 1dB difference. For one-shot measurement, 3dB difference. We need to categorize cases.

Intel: agree with Apple approach.

Ericsson: we have studied the cell specific procedure. Cell specifc procedure is based on L3.

CMCC: we do not want to consider the RRC connected mode. Idle mode and inactive mode are enough.

Vivo: considering L3 is sufficient.

Apple: regarding the idle mode and connected mode, I do not think connected mode is the new case to RAN4. We are open to discuss it.

**Agreement:**

* Only consider L3 measurement and the cell specific threshould
* Down-select to
  + **Option 2 :** A RedCap UE with 1 Rx branch applies the offset to all cell-specific RSRP thresholds, including the ones used for Rel-16 low mobility and/or not at cell edge conditions, and Rel-17 stationary and not at cell edge conditions for RRC idle/inactive state.
    - FFS on the offset values
  + **Option 3:** Not introduce threshold offset in spec and the measurement difference gap between 1Rx and 2RX is up to UE implementation.
  + **Option 6:** Consider the listed five scenario in LS R4-2206951 and define the fixed value case by case for each scenario.
    - Further discuss whether to limit the scenario which is related to coverage
    - Need consider SDT scenario.
* Remove the rsrp-ThresholdBFR from the previous LS and send the new LS to RAN2, if RAN4 agreed to limit to idle and inactive modes.

**Issue 6-2-2: Applicability of cell-specific RSRP offset to relaxed measurement criteria**

* Proposals
  + **Option 1 (Ericsson):** 
    - RAN4 does not recommend that the RedCap UE with 1 Rx branch applies the offset to any of the conditions or thresholds used for any relaxed measurement criteria defined in Rel-16 or Rel-17.
  + **Option 2 (Apple, Nokia):**
    - RedCap UE with 1 Rx branch applies the offset to all cell-specific RSRP thresholds, including the ones used for Rel-16 low mobility and/or not at cell edge conditions, and Rel-17 stationary and not at cell edge conditions for RRC idle/inactive state.
  + **Option 2a (Intel):**
    - introduce separate offsetRSRPChange, RRM Relxation, offsetReselectionThreshold and offsetReselectionThresholdQ for RRM relaxation evaluation in IDLE/INACTIVE if RAN4 agree to consider them within the scope of 1 Rx. configuring margin for Rel-17 RedCap UEs.
    - consider separate offsetL3, RSRPChange and offsetL3, Quality for RLM/BFD relaxation evaluation in CONNECTED if RAN4 agree to consider them within the scope of 1 Rx. configuring margin for Rel-17 RedCap UEs.
  + **Option 3 (HW):** Not introduce threshold offset in spec and the measurement difference gap between 1Rx and 2RX is up to UE implementation.
  + **Option 4 (MTK):** If RAN4 would like to introduce offset for other RSRP threshold (for all cell-specific RSRP thresholds) then this shall be discussed case by case
* Recommended WF
  + Discuss the options.

**Issue 6-2-3: Applicability of cell-specific RSRP offset to cell (re)selection thresholds**

* Proposals
  + **Option 1 (Ericsson, Nokia):** 
    - RAN4 considers that it is beneficial for the RedCap UE with 1 Rx branch to apply configurable offset to the cell (re)selection thresholds: *Qrxlevmin* and *Qqualmin*
  + **Option 2 (Apple):** 
    - RAN4 to confirm that a RedCap UE with 1 Rx branch can apply a predefined offset to cell (re)selection thresholds, i.e., Qrxlevmin and Qqualmin.
* Recommended WF
  + Discuss the options.

**Discussion:**

Ericsson: the previous agreement applies to cell specific RSRP offset to cell (re)selection thresholds. The value should be the same.

CMCC: the prevous agreement has already captured this.

Ericsson: it is not very clear if the cell (re)seletion is included.

**Chair=>** discuss this issue together with Issue 6-2-1.

**Issue 6-2-4: Fixed or configurable offsets**

* Proposals
  + **Option 1 (Nokia, vivo):** RAN4 to discuss whether to define configurable offsets to all RSRP/ RSRQ thresholds for 1 Rx RedCap UEs either from Rel-17 or from Rel-18.
  + **Option 2 (MTK, Apple):** RAN4 can agree to provide offset if it is given as a constant value in the RAN4 specification.
* Recommended WF
  + Discuss the options.

**Chair**=> this issue should not be discussed in this meeting.

**Sub-topic 5-2 CSSF, gap related issues**

**Issue 5-2-1: CSSF assumptions for intra/inter-frequency measurement with MG**

* Proposals
  + **Option 1 (Apple):** If intra-frequency measurement is with MG, CSSFoutside\_gap,i = Y for inter-frequency measurement with no measurement gap, Y is the number of configured inter-frequency MOs without MG that are being measured outside of MG.
  + **Option 2 (CMCC, HW):** When SMTC occasions of inter-frequency measurement object are partially overlapped by the measurement gap are measured outside of MG, RedCap UEs should perform inter-frequency MOs outside MG. If UE supports this inter-frequency without gap, the flag of [inter-frequency\_config\_R16] is configured by network
* Recommended WF
  + Discuss the options

**Discussion:**

Huawei: we can agree with both options.

Apple: support two options. For option 2, even though it is not explicitly mentioned network flag, I think the network flag will be used to indicate UE to do measurement outside the gap.

Nokia: We support both options.

CMCC: we support two options. We confirm understanding from Apple.

**Agreement:**

* If intra-frequency measurement is with MG, CSSFoutside\_gap,i = Y for inter-frequency measurement with no measurement gap, Y is the number of configured inter-frequency MOs without MG that are being measured outside of MG.
* When SMTC occasions of inter-frequency measurement object are partially overlapped by the measurement gap are measured outside of MG, RedCap UEs should perform inter-frequency MOs outside MG. If UE supports this inter-frequency without gap, the flag of [inter-frequency\_config\_R16] is configured by network.

**Issue 5-2-2: Whether to support for per-FR gap**

* Proposals
  + **Option 1 (OPPO, CMCC, Ericsson, HW, vivo, Nokia):**  If a RedCap UE support both FR1 and FR2, whether RedCap UE can support per-FR gap(e.g., independentGapConfigdf) depends on UE capability.
    - **Option 1a (Nokia):** Specify separate measurement requirements and interruption requirements for per-FR gap compared to per-UE gap. Support of per-UE gap is mandatory for RedCap UE supporting FR1 and FR2, whilst support of per-FR gap is optional and indicated as UE capability.
    - **Option 1b (OPPO):** As compromise, it is also fine for Redcap UE to only support per UE gap in R17.
  + **Option 2 (MTK):** If MG is needed, both per-UE and per-FR MG can be supported by UE, but they both share the same per-UE MG based cell identification/measurement requirements.
* Recommended WF
  + Discuss the options.

**Discussion:**

Mediak: we can support both. The requirement should be per-UE MG to make it simple. The requirement is the same.

Apple: for option1, if UE claims to support per-RF gap, does it mean UE do measurement on one FR and receive the data from the other FR since WID limits the single carrier.

Nokia: we agree option 1 and option 1a. Per-FR is optional capability.

Ericsson: We support option 1. If UE supports per-FR gap, it means UE to support measurement in one FR and receive data.

Vivo: we can use option 1 as compromise. Maybe in the end there is no difference between per-UE and per-FR gap.

CATT: we consider per-FR gap. Option 1 is the baseline. We can further discuss the interruption.

CMCC: we cannot change the definition of per-FR gap. We can use the same approach to treat the other features. The specification should explicitly preclude the features and at the same time no additional work is expected.

Qualcomm: we generally agree with per-FR gap. But RedCap has only one searcher which cannot measure two FR simultaneously. There will be some interruption requirements. We wonder how it can work with single searcher.

OPPO: Define the requirments only for per-UE gap in Rel-17.

Huawei: in our understanding, per-FR is not related to single or multiple searcher, which is related to UE behaviour. It is not related to do measurement on one FR and do reception on the other FR.

Qualcomm: How perform the measurement in one FR and receive data in other RF is related to searcher somehow. It is not CA case. UE can deactive one FR at the same time.

Huawei: here we are discussing the data reception and measurement. For CA, we discusse two serving cells for which UE need receive data at the same time.

Ericsson: we have the same understanding as Huawei.

Nokia: we have no assumption on the searcher number.

Qualcomm: I understand the optional capability. We disagree with UE should do measurement on one band and receive data on the other band.

Mediatek: On the number of searcher, we have different views from Huawei and Ericsson. The gap has the same offset. UE needs to do concurrent measurement on FR1 and FR2 within the same gap.

**Agreement:**

* If a RedCap UE support both FR1 and FR2, whether RedCap UE can support per-FR gap(e.g., independentGapConfigdf) depends on UE capability.
* Define the requirements only considering per-UE gap in Rel-17.

**Topic #7: Performance part of RedCap**

**Issue 7-2-1: Test configurations**

* Proposals
* Recommended WF
  + Companies are encouraged to provide comments directly to the CRs.

**R4-2213752, R4-2213003, R4-2211692**

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**[104-e][224] NR\_redcap\_RRM\_2, AI 9.18.3.2~9.18.3.4 – Xusheng Wei**

**R4-2214144 Email Discussion Summary for [104-e][224] NR\_redcap\_RRM\_2**

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

**Abstract:**

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

**Decision: Revised to R4-2214275**

**R4-2214275 Email Discussion Summary for [104-e][224] NR\_redcap\_RRM\_2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214486  R4-2215162 | WF on eDRX and RRM measurement relaxations requirements for Redcap UE | vivo | Agreeable |
| R4-2214487 | Reply LS on RRM relaxation for Redcap | vivo | Agreeable |
| R4-2214488 | Reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | Huawei | Agreeable |
| R4-2214495 | CR for RRM relaxation on R16 not at cell edge and R17 stationary for idle and inactive state mobility for Redcap | vivo | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2212996](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212996.zip) | R4-2214608 | Correction on measurement with eDRX for RedCap UE | Huawei, HiSilicon | Agreeable |  |
| [R4-2212998](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212998.zip) | R4-2214609 | CR on higher priority inter-frequency measurement relaxation for RedCap | Huawei, HiSilicon | Agreeable |  |
| R4-2213000 | R4-2214610 | Corrections on measurement relaxations mixed with eDRX for Redcap UE | Huawei, HiSilicon | Agreeable |  |
| [R4-2213459](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213459.zip) |  | draft CR for RRM relaxation for idle and inactive state mobility for Redcap | vivo | Noted |  |

**GTW on Aug-16**

**Sub-topic 3-2 Reply LS for R2- 2201760**

**------------------------------------ LS -------------------------------**

***1. Overall Description:***

*Regarding the following scenario mentioned by RAN1 in the LS provided in R1-2112802:*

* *For a separate initial DL BWP (if it does not include CD-SSB and the entire CORESET#0) from RAN1 perspective,*
  + *If it is configured for random access while not for paging in idle/inactive mode, RedCap UE does NOT expect it to contain SSB/CORESET#0/SIB.*

*RAN2 has discussed this scenario and how a RedCap UE performs RSRP measurements before Msg1 or MsgA retransmission on separate initial UL BWP and agreed on the following."*

* *“From RAN2 perspective, if a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, it is up to UE implementation to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission.”*

*RAN2 respectfully asks RAN4 and RAN1 to take the agreement above into consideration and check if any update is required in their specifications.*

***2. Actions:***

***To RAN4 and RAN1***

***ACTION:*** *RAN2 kindly asks RAN4 and RAN1 to take the agreement above into consideration and check, as it is up to RAN4 and RAN1, if any update is required in their specifications.*

**------------------------------------ LS --------------------------------**

**Issue 3-2-1: On draft reply LS to R2- 2201760**

* Proposals
  + Option 1: RAN4 concludes that RAN2’s understanding on “it is up to UE implementation to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission” is right and it is up to RAN2 to determine how to progress this work (vivo)
* Recommended WF
  + To moderator’s understanding it is good to have this LS replied from procedure point of view even there is no RAN4 impact.

**Discussions:**

Vivo: the majority view is that there is no impact on RAN4 spec. Our preference is still to send LS.

Nokia: Similar view like Chair. There is no action for RAN4. We should not have LS.

Vivo: the other way is that we just have agreement that there is no impact on RAN4 agreement.

**Agreement:**

* There is no impact on RAN4 RRM specification from LS R1-2112802.

**Sub-topic 3-1 On offset to transmit CD-SSB and NCD-SSB at different times**

**Issue 3-1-1: NCD-SSB time offset**

* Proposals
  + Option 1 (Huawei, Ericsson): The MGRP of MG can be a candidate values for NCD-SSB time offset.
    - Option 1a(Ericsson): At least MGRP=40ms should be introduced.
    - Option 1b(Huawei): Additional offset values, i.e., 20ms, 40ms, 60ms
  + Option 2 (Apple): Support the RAN2 proposal with the value {sf5, sf10, sf15, spare5, spare4, spare3, spare2, spare1}.
* Recommended WF
  + Discuss the options.

**Discussions:**

Ericsson: our view is option 1. We need consider MGRP offest. We are fine to use 20 and 40ms.

Vivo: similar view as Ericsson. We try to agree with minimum set of offest values (20 and 40ms) and further discuss others.

Apple: we can compromise to option 1. For MGRP, 20 and 40 is good choice.

Huawei: we also compromise to add addtional 20 and 40 ms.

Nokia: agree to 20 and 40ms, which are most important.

Qualcomm: we are fine to 20 and 40 and need further discussion on other values.

**Agreement:**

* For NCD-SSB time offset, add the addtional MGRP values of 20ms and 40ms, and further discuss whether and what other values are needed.

**Session Chair: the agreement above means that the values of 20ms and 40ms which resemble the existing MGRP values are added as NCD\_SSB time offset candidate values.**

**Issue 3-1-2: NCD-SSB time offset impact**

* Proposals
  + Option 1: When the SSB for intra-frequency measurement is fully-partially overlapping with the MG due to SSB offset, UE is required to perform intra-frequency measurement and drop the configured MG. (Ericsson)
* Recommended WF
  + Discuss the options.

**Discussions:**

Ericsson: This scenario is for intra-frequency. NCD-SSB offset is 5ms. When network configure CD-SSB, after the BWP is switching, UE is switched from CD-SSB to NCD SSB but the configuration of MG is fixed somehow.

Qualcomm: we cannot agree with the proposal, which has implication on hwo UE handels the colliding case. We need more analysis.

Vivo: We can have more offline discussion.

Apple: it would be easier for network to coordinate the measurement gaps.

**Sub-topic 2-1 General aspects for RRM measurment relaxation for Redcap**

**Issue 2-1-1: Whether Scenario 8 should be allowed or not**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Rel-16 relaxation criterion** | **Rel-17 relaxation criterion** | **Applicability** |
| 8 | Rel-16 not-at-cell-edge | Rel-17 stationary |  |

* Proposals
  + Option 1: Case 8 is supported (Apple Xiaomi Huawei vivo MTK)
  + Option 2: Case 8 is not supported (CMCC Ericsson)
* Recommended WF
  + Could company compromise to option 1.

**Discussions:**

Moderator: we have conclusion before case 8 is not supported. We simply followed the RAN2 LS. In previous meetings, we got the new LS from RAN2 that case 8 is allowed. It is quite straightforward.

Qualcomm: we support option 1.

Mediatek: we agree with moderator. Case 8 should be supported.

Nokia: we have different opinion. RAN2 clearly indicates case 8 should not be considered. We would like to stick to the previous agreement. We do not want to go back to touch the core requirement. There is no advantage to introduce the combination.

CMCC: based on RAN2 latest LS, network can configure Rel-16 and Rel-17 criterion. UE just needs to meet one of them to perform RRM relaxation. Case 8 can be supported from signalling perspective and further discuss the requirement.

Ericsson: we are fine with Option 1.

Apple: we also support option 1. In the network, both Rel-16 and Rel-17 UEs exist. Netowrk can configure both. UE won’t apply the further relaxation on top of each other. UE just needs to follow the most relaxed one.

Vivo: to Nokia, Nokia comment is based on the previous LS. In the latest one, RAN2 clearly indicate case 8 is supported.

Mediatek: to Nokia, basically the confusion is what happens to combine them. To requirements, we have agreed that UE needs follow the most relaxed requirements.

Ericsson: It is related to whether it can be supported or not.

**Agreement:**

* Scenario 8 is supported

**Issue 2-1-1-1: Requirements for scenario 8 if scenario 8 is allowed**

* Proposals
  + Option 1: If UE can meet both Rel-16 not-at-cell-edge and Rel-17 stationary conditions, the UE is allowed to meet the requirements that are the most relaxed out of Rel-16 not-at-cell-edge and Rel-17 stationary RRM relaxation requirements. (Apple Huawei)
  + Option 2: UE could follow the requirements when both Rel-17 not-at-cell-edge criteria and Rel-17 stationary criteria are satisfied. (vivo)
* Recommended WF
  + To moderator understanding when multiple criteria are configured and met, it is more logic for the requirements to be based on similar requirements when multiple criteria are satisfied in Rel-16/Rel-17 instead of basing on the most relaxed requirements when a single criteria is satisfied.

**Discussions:**

Mediatek: we have already had agreement that UE is required to meet the most relaxed requirement.

Ericsson: Aligned with Mediatek

**Chair=>** Follow the previous agreement that UE is required to meet the most relaxed requirement

**Agreement:**

* For scenario 8, if UE can meet both Rel-16 not-at-cell-edge and Rel-17 stationary conditions, the UE is allowed to meet the requirements that are the most relaxed out of Rel-16 not-at-cell-edge and Rel-17 stationary RRM relaxation requirements.
  + The most relaxed requirement is the Rel-17 stationary RRM relaxation requirements.

--------------------------------------------- LS -------------------------------------------

***1. Overall Description:***

*RAN2 would like to thank RAN4 for the LS on RRM relaxation. Based on further RAN4 progress, RAN2 discussed the coexistence of Rel-16 and Rel-17 RRM relaxation, and achieved the following agreements:*

***Regarding the coexistence cases of Rel-17 and Rel-17 RRM relaxation:***

1. *Simultaneous configuration of R16 not-at-cell-edge criterion and R17 stationary criterion for idle/inactive mode is a valid configuration from the network’s point of view, where the network supports RRM relaxation for both R16 and R17 UEs in idle/inactive mode.*
2. *From signalling’s point of view, any R16 RRM relaxation criterion and any R17 RRM relaxation criterion for idle/inactive mode can be configured in a same cell at a same time, as independent criteria (i.e., without requiring a UE to fulfil both the R16 and the R17 criteria in order to relax its RRM measurements).*
3. *If combined with a not-at-cell-edge criterion (i.e. for Rel-17 stationary & Rel-17 not-at-cell-edge), the R17 stationary criterion can only be combined with the R17 not-at-cell-edge criterion, not with the R16 one.*

***In this way, RAN2 kindly request RAN4 to consider support cases#8 and case #9 in the previous LS [R2-2204487/R4-2207109]. But it is up to RAN4 to make the final decision on whether support case#8 and case#9, for example, considering other reasons from RAN4 (if any).***

*Besides, RAN2 also discussed the relaxation criteria, and achieved the following agreements:*

***Regarding the relaxation criteria:***

1. *RAN2 assume to change the “Srxlev” for stationary criterion to “SS-RSRP” in RRC\_CONNECTED, pending confirmation by RAN4. Please find the below TP (which has been agreed and will be implemented in TS 38.331) for your reference:*

|  |
| --- |
| ***5.7.4.4 Relaxed measurement criterion for a stationary UE***  *The relaxed measurement criterion for a stationary UE is met when:*  *- (~~Srxlev~~SS-RSRP RefStationaryConnected – SS-RSRP~~Srxlev~~) < SSearchDeltaP-StationaryConnected,*  *Where:*  *- ~~Srxlev~~ SS-RSRP = ~~current Srxlev value of the PCell~~ current L3 RSRP measurement of the PCell based on SSB (dB).*  *- ~~Srxlev~~ SS-RSRP RefStationaryConnected = reference SS-RSRP~~Srxlev~~ value of the PCell cell (dB), set as follows:*  *- At the end of RRC reconfiguration procedure as specified in 5.3.5.3, when rrm-MeasRelaxationReportingConfig is included in the RRCReconfiguration message; or*  *- If (~~Srxlev~~ SS-RSRP–~~Srxlev~~ SS-RSRP RefStationaryConnected) > 0; or*  *- If the relaxed measurement criterion has not been met for TSearchDeltaP-StationaryConnected:*  *- The UE shall set the value of ~~Srxlev~~ SS-RSRP RefStationaryConnected to the current ~~Srxlev~~ SS-RSRP value of the serving cell.* |

***RAN2 would like to confirm with RAN4 whether it is reasonable, or whether there is any concern from RAN4.***

***2. Actions:***

***To RAN WG4:***

*RAN2 kindly request RAN4 to take the above information into account during the following work, and provide feedback, if any.*

--------------------------------------------- LS -------------------------------------------

**Issue 2-1-2 Update the “Srxlev” for stationary criterion to “SS-RSRP” in RRC\_CONNECTED (question from RAN2 LS R2-2206418)**

* Proposals
  + Option 1: the SS-RSRP in stationary condition TP from RAN2 LS shall be revised as: SS-RSRP = current L3 RSRP measurement of the PCell based on an identical SSB (dB) (Apple)
  + Option 2: It is proposed to check with RAN2 whether CSI-RSRP can be used to evaluate the relaxed measurement criterion for stationary UE in addition to SS-RSRP (CMCC)
  + Option 3: From RAN4 perspective, it is reasonable to change the “Srxlev” for stationary criterion to “SS-RSRP” in RRC\_CONNECTED (Huawei Ericsson vivo)
* Recommended WF
  + Could option 3 is used as the baseline for replying LS, whether other options (option 2) included in the reply LS or not is up to further discussion.

**Discussions:**

Moderator: majority view is option 3.

Apple: we are OK with the terminolgiy change. The definition shuld be clarified based on RAN4 discussion.

CMCC: we need clarify whether CSI-RS RSRP is artificially precluded from RAN2.

Huawei: we agree to use option 3 as baseline. For option 1, we wonder if there is difference UE evaluate based on different SSB. RAN4 needs to first evaluate. RAN2 has discussed this issue and they sent the LS without mentioning the issue identified for different SSB based measurement.

Nokia: support option 3. We have the same understanding as Huawei that no consensus in RAN2.

Qualcomm: for option 1, what does identical SSB mean? It is not clear to me. For option 2, we can stick to SS-RSRP for simplicity.

Vivo: RAN2 has discussed for option 1. We need focus on the question from RAN2.

Apple: For RAN1,

**Agreement:**

* Option 3 is used as the baseline for replying LS.

9.19 Positioning enhancements for NR

9.19.3 Moderator summary and conclusions

**[104-e][225] NR\_pos\_enh\_1, AI 9.19.1, 9.19.1.2, 9.19.1.4, 9.19.2 – Muhammad Kazmi**

**R4-2214145 Email Discussion Summary for** **[104-e][225] NR\_pos\_enh\_1**

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

**Abstract:**

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

**Decision: Revised to R4-2214276**

**R4-2214276 Email Discussion Summary for [104-e][225] NR\_pos\_enh\_1**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214489 | LS on alignment of supportedDL-PRS-ProcessingSamples in RRC\_CONNECTED and RRC\_INACTIVE | CATT | Agreeable |
| R4-2214490 | Simulation assumptions for PRS-RSRP and UE Rx-Tx Time difference for higher side condition | Ericsson | Agreeable |
| R4-2214491 | WF on NR Positioning Enhancements (Part 1) | Ericsson | Agreeable |
| R4-2214496 | Draft CR on new PRS RMC based on the serving cell RF BW and RMC for PPW | Huawei, HiSilicon | Agreeable |
| R4-2214497 | Applicability rules for test cases | Ericsson | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211726 | R4-2214564 | CR on PRS measurement period requirements | CATT | Agreeable |  |
| R4-2211729 |  | CR: Introduction of BDS B2a and B3I signals inTS 36.171 requirements for support of A-GNSS | CATT, CAICT, CENC | Agreeable |  |
| R4-2211730 |  | CR: Introduction of BDS B2a and B3I signals inTS 38.171 requirements for support of A-GNSS | CATT, CAICT, CENC | Agreeable |  |
| R4-2211731 | R4-2214891 | Test set 2-4:PRS-RSRPP accuracy and report mapping in FR1 and FR2 | CATT | Agreeable |  |
| R4-2211732 | R4-2214892 | Test set 3-5:PRS-RSRP reporting delay test case with reduced number of samples in FR1 | CATT | Agreeable |  |
| R4-2211733 | R4-2214893 | Test set 3-6:PRS-RSRP reporting delay test case with reduced number of samples in FR2 | CATT | Agreeable |  |
| R4-2211734 | R4-2214894 | Test set 3-23:UE Rx-Tx reporting delay test case in FR1 in RRC\_INACTIVE | CATT | Agreeable |  |
| R4-2211735 | R4-2214895 | Test set 3-24:UE Rx-Tx reporting delay test case in FR2 in RRC\_INACTIVE | CATT | Agreeable |  |
| R4-2211736 | R4-2214896 | Test set 4-7:UE Rx-Tx accuracy test case with reduced number of samples in FR1 | CATT | Agreeable |  |
| R4-2211737 | R4-2214897 | Test set 4-8:UE Rx-Tx accuracy test case with reduced number of samples in FR2 | CATT | Agreeable |  |
| R4-2211738 | R4-2214898 | Test set 4-23:UE Rx-Tx accuracy test case with reduced number of samples in FR1 in RRC\_INACTIVE | CATT | Agreeable |  |
| R4-2211739 | R4-2214899 | Test set 4-24:UE Rx-Tx accuracy test case with reduced number of samples in FR2 in RRC\_INACTIVE | CATT | Agreeable |  |
| R4-2211740 | R4-2214900 | Test set 4-27:RSTD accuracy test case with Rx TEG in FR1 | CATT | Agreeable |  |
| R4-2211741 | R4-2214901 | Test set 4-28:RSTD accuracy test case with Rx TEG in FR2 | CATT | Agreeable |  |
| R4-2212046 |  | CR to pre-configured Pos gap activation limitation | OPPO | Merged in R4-2211726 |  |
| R4-2212048 | R4-2214931 | Draft CR to Test sets 4-17 PRS-RSRPP accuracy test case in FR1 in RRC\_INACTIVE | OPPO | Agreeable |  |
| R4-2212049 | R4-2214932 | Draft CR to Test sets 4-25 PRS-RSRPP accuracy test case with reduced number of samples in FR1 in RRC\_INACTIVE | OPPO | Agreeable |  |
| R4-2212050 | R4-2214933 | Draft CR to Test sets 4-9 PRS-RSRPP accuracy test case with reduced number of samples in FR1 | OPPO | Agreeable |  |
| R4-2212051 | R4-2214934 | Draft CR to Test sets 4-18 PRS-RSRPP accuracy test case in FR2 in RRC\_INACTIVE | OPPO | Agreeable |  |
| R4-2212052 | R4-2214935 | Draft CR to Test sets 4-26 PRS-RSRPP accuracy test case with reduced number of samples in FR2 in RRC\_INACTIVE | OPPO | Agreeable |  |
| R4-2212053 | R4-2214936 | Draft CR to Test sets 4-10 PRS-RSRPP accuracy test case with reduced number of samples in FR2 | OPPO | Agreeable |  |
| R4-2212136 | R4-2214940 | Test sets 3-1: RSTD reporting delay test case with reduced number of samples in FR1 | Intel Corporation | Agreeable |  |
| R4-2212137 | R4-2214941 | Test sets 3-2: RSTD reporting delay test case with reduced number of samples in FR2 | Intel Corporation | Agreeable |  |
| R4-2212138 | R4-2214942 | [draftCR] CR for UE Rx-Tx accuracy and report mapping in FR1 and FR2 | Intel Corporation | Agreeable |  |
| R4-2212199 | R4-2214944 | Test sets 3-27, 3-29, 3-31: DraftCR – FR1 test cases for NR positioning measurement delay in RRC\_INACTIVE with Nsample=1 | Qualcomm | Agreeable |  |
| R4-2212200 | R4-2214945 | Test sets 3-28, 3-30, 3-32: DraftCR – FR2 test cases for NR positioning measurement delay in RRC\_INACTIVE with Nsample = 1 | Qualcomm Incorporated | Agreeable |  |
| R4-2213033 | R4-2214998 | Draft CR on test set 3-15:UE Rx-Tx reporting delay test cases without gaps in FR1 | vivo | Agreeable |  |
| R4-2213034 | R4-2214999 | Draft CR on test set 3-16:UE Rx-Tx reporting delay test cases without gaps in FR2 | vivo | Agreeable |  |
| R4-2213035 | R4-2215000 | Draft CR on test set 4-15:UE Rx-Tx accuracy test case in FR1 in RRC\_INACTIVE | vivo | Agreeable |  |
| R4-2213036 | R4-2215001 | Draft CR on test set 4-16:UE Rx-Tx accuracy test case in FR2 in RRC\_INACTIVE | vivo | Agreeable |  |
| R4-2213037 | R4-2215002 | Draft CR on test set 4-21:PRS-RSRP accuracy test case with reduced number of samples in FR1 in RRC\_INACTIVE | vivo | Agreeable |  |
| R4-2213038 | R4-2215003 | Draft CR on test set 4-22:PRS-RSRP accuracy test case with reduced number of samples in FR2 in RRC\_INACTIVE | vivo | Agreeable |  |
| R4-2213256 |  | CR to 38.133 LMF configured Rx beam sweeping factor for PRS measurement | Ericsson | Merged in R4-2213535 |  |
| R4-2213257 |  | CR to 38.133 measurement period requirement for gapless PRS measurement | Ericsson | Merged in R4-2211726 |  |
| R4-2213258 | R4-2214621 | CR to 38.133 scheduling restriction when PRS has lower priority than other DL signals/CCs | Ericsson | Agreeable |  |
| R4-2213264 | R4-2215032 | DraftCR set 2-1 to 38.133 RSTD accuracy and report mapping in FR1 and FR2 | Ericsson | Agreeable |  |
| R4-2213265 | R4-2215033 | DraftCR to 38.133 on additional path measurement report mapping | Ericsson | Not pursued |  |
| R4-2213268 | R4-2215034 | DraftCR to 38.133 on accuracy requirement in RRC inactive state | Ericsson | Not pursued |  |
| R4-2213269 | R4-2215035 | Test sets 3-19, 3-25, 3-33 CR to introduce reporting delay test cases in RRC\_INACTIVE FR1 | Ericsson | Agreeable |  |
| R4-2213270 | R4-2215036 | Test sets 3-1, 3-9, 3-11, 3-17, 3-35 CR to introduce reporting delay test cases in RRC\_CONNECTED state FR1 | Ericsson | Agreeable |  |
| R4-2213271 | R4-2215037 | Test sets 3-20, 3-26, 3-34 CR to introduce reporting delay test cases in RRC\_INACTIVE FR2 | Ericsson | Agreeable |  |
| R4-2213272 | R4-2215038 | Test sets 3-2, 3-10, 3-12, 3-18, 3-36 CR to introduce reporting delay test cases in RRC\_CONNECTED FR2 | Ericsson | Agreeable |  |
| R4-2213273 | R4-2215039 | Test sets 4-11 and 4-19 CR to introduce RSTD accuracy test cases in RRC\_INACTIVE FR1 | Ericsson | Agreeable |  |
| R4-2213274 | R4-2215040 | Test set 4-3 CR to introduce RSTD accuracy test case with reduced number of samples FR1 in RRC\_CONNECTED state | Ericsson | Agreeable |  |
| R4-2213275 | R4-2215041 | Test sets 4-12 and 4-20 CR to introduce RSTD accuracy test cases in RRC\_INACTIVE FR2 | Ericsson | Agreeable |  |
| R4-2213276 | R4-2215042 | Test set 4-4 CR to introduce RSTD accuracy test case with reduced number of samples in FR2 in RRC\_CONNECTED state | Ericsson | Agreeable |  |
| R4-2213532 |  | CR on PRS measurement period with reduced latency | Huawei, HiSilicon | Merged in R4-2211726 |  |
| R4-2213533 | R4-2214637 | CR on applicability of measurement requirements with POS MG | Huawei, HiSilicon | Agreeable |  |
| R4-2213537 |  | CR on scheduling restriction for PRS measurement outside MG | Huawei, HiSilicon | Merged in R4-2213258 |  |
| R4-2213538 |  | CR on measurement period for PRS measurement outside MG | Huawei, HiSilicon | Merged in R4-2211726 |  |
| R4-2213539 | R4-2214639 | CR on starting point of measurement period for scheduled location | Huawei, HiSilicon | Postponed |  |
| R4-2213541 | R4-2215070 | CR on general performance requirements for ePOS | Huawei, HiSilicon | Agreeable |  |
| R4-2213542 | R4-2215071 | Accuracy set 2-2: CR for PRS-RSRP accuracy and report mapping | Huawei, HiSilicon | Agreeable |  |
| R4-2213543 | R4-2215072 | Test set 3-21: CR to introduce measurement delay TCs for INACTIVE FR1 | Huawei, HiSilicon | Agreeable |  |
| R4-2213544 | R4-2215073 | Test set 3-7, 3-13 and 3-37: CR to introduce measurement delay TCs for CONNECTED FR1 | Huawei, HiSilicon | Agreeable |  |
| R4-2213545 | R4-2215074 | Test set 3-22: CR to introduce measurement delay TCs for INACTIVE FR2 | Huawei, HiSilicon | Agreeable |  |
| R4-2213546 | R4-2215075 | Test set 3-8, 3-14 and 3-38: CR to introduce measurement delay TCs for CONNECTED FR2 | Huawei, HiSilicon | Agreeable |  |
| R4-2213547 | R4-2215076 | Test set 4-13: CR to introduce measurement accuracy TCs for INACTIVE FR1 | Huawei, HiSilicon | Agreeable |  |
| R4-2213548 | R4-2215077 | Test set 4-1 and 4-5: CR to introduce measurement accuracy TCs for CONNECTED FR1 | Huawei, HiSilicon | Agreeable |  |
| R4-2213549 | R4-2215078 | Test set 4-14: CR to introduce measurement accuracy TCs for INACTIVE FR2 | Huawei, HiSilicon | Agreeable |  |
| R4-2213550 | R4-2215079 | Test set 4-2 and 4-6: CR to introduce measurement accuracy TCs for CONNECTED FR2 | Huawei, HiSilicon | Agreeable |  |
| R4-2213772 | R4-2214644 | CR to 38.133 clarification on measurement period requirements in RRC\_CONNECTED state | Ericsson | Agreeable |  |
| R4-2214063 |  | Updated work split on performance requirements for positioning enhancement | Ericsson | Agreeable |  |
| R4-2214066 | R4-2215103 | Set 1-2: PRP and PRS Ês/Iot conditions for NR PRS-based measurements | Ericsson | Agreeable |  |

**GTW on Aug-17**

**Sub-topic 3-1: Test configuration**

**Issue 3-1-2: PRS BW in accuracy tests**

* Proposals
  + Proposal 1: HW
    - For accuracy TCs with reduced sample number, the PRS BW is the two sub-tests are
      * Sub-test 1: serving cell RF BW, with Nsample=1
      * Sub-test 2: large BW in existing PRS RMC, with Nsample=2
* Recommended WF
  + Discussion needed

**Discussions:**

Ericsson: in the last meeting, we have already had the agreement. We agreed to consider only 1 sample under the condition.

Qualcomm: Similar comment as Ericsson. For Nsample=2, there is discussion on-going about applicability. Keep the previous agreement.

CATT: Similar view. In Rel-16 we have two sub tests since the bandwidth is different. In Rel-17 the accuracy for N=1 or 2 is the same. There is no need to define two tests.

Huawei: we would like to clarify. We have different accuracy for different bandwidth rather than sample numbers. If majority view is to have only one set, we are OK to Sub-set1.

Intel: Prefer one test. If company had concern on the test coverage, the compromise is to define two test cases with different bandwidth and N=1.

**Agreement:**

* For accuracy test case with reduced sample number, define only the Sub-test 1
  + Sub-test 1: serving cell RF BWs and with Nsample=1 which applies to all the test cases with reduced number of samples
    - FFS on the range of serving cell RF BWs

**Sub-topic 3-3: Side conditions for PRS measurements**

**Issue 3-3-1: PRS-RSRP higher side condition**

* Proposals
  + Proposal 1: E///
    - Rel. 16 PRS RSRP values corresponding to PRS BW ≥ 24 and Es/Iot ≥ -3dB shall be reused to define PRS RSRP accuracy requirement corresponding to side conditions Es/Iot≥ [-3dB] applicable to AWGN channel and PRS BW ≥ 48 PRBs.
* Recommended WF
  + Discussion needed

**Discussions:**

Qualcomm: we had agreement to reuse the Rel-16. We need to talk about the timeline to complete the test. It is not realistic.

Vivo: what is the channel condition? We specify the accuracy requirement for both AWGN and fading channel. We need some clarification. If we want to have new side condition, we need simulation. But it is difficult at this stage.

Huawei: we are open to proposal 1. It makes sense. We also agree with Qualcomm that some new simulation is needed. We need simulation to verify the accuracy can be met at -3dB. Es/Iot condition should be TBD.

Intel: about Huawei proposal, if we need time to evaluate condition, how can we define the requirements?

Ericsson: for vivo question, the accuracy applies for both channel conditions. We agree with Huawei suggestion. Keeping Es/Iot as TBD but the accuracy value can be taken from Rel-16 table.

**Issue 3-3-2: UE Rx-Tx time difference higher side condition (with reduced number of samples)**

* Proposals
  + Proposal 1: E///
    - Rel. 16 UE Rx-Tx accuracy values corresponding to PRS BW ≥ 24 and Es/Iot ≥ -3dB shall be reused to define UE Rx-Tx accuracy requirement corresponding to side conditions Es/Iot≥ [-3dB] applicable to AWGN channel and PRS BW ≥ 48 PRBs.
* Recommended WF
  + Discussion needed

**Discussions:**

**Chair=>** discuss it together with issue 3-3-1.

**Issue 1-2-3: Measurement period for multiple PFLs**

* Proposals
  + Proposal 1: QC
    - When the UE is configured to measure multiple PFLs without measurement gaps,
    - If the UE supports DL-PRS processing component 2b (N2, T2) on all the activated PPWs. the measurement period is the maximum measurement period across layers
      * The starting point of the measurement period for each PFL would be different depending on the corresponding PPW slot offset (activated PPWs cannot overlap in time)
      * The overall measurement period ends when the measurement periods for all the PFLs have ended.
    - Otherwise, the measurement period requirement is based on the sum-approach as for measurements within gap.
  + Proposal 2: HW
    - If there are more than one PFLs within an active BWP, it is up to UE implementation to choose one PFL to measure, and no measurement requirements would apply.
    - Define requirements for multiple PFLs as
      * sum(Tmeas,i) + (L-1)\*max(Teffect,i), if multiple PFLs are in Case 1 (same as measurement within MG)
      * max(Tmeas,i + Tuncertainty,i), if multiple PFLs are in Case 2, where Tuncertainty,i is the time from the start of the first PPW occasion for PFL#i to the start of measurement period.
* Recommended WF
  + Discussion needed

**Discussions:**

Huawei: both proposal 1 and proposal 2 address the separate scenarios. Both proposals are the similar. The multiple PFLs are based on max approach. There is another scenarios, for which we are not sure if we need to define requirements.

Ericsson: first issue is to address N2 T2 values. They are corner case. We should not define requirements. RAN1 agreed the single PFL. We should define the requirement for it.

Vivo: it is not clear what the typical scenario for multiple PFLs is. There is only one PPW activated at a time. I am not sure if we just use one PPW to cover all the frequency layers. It may be possible. The necessity needs further discussion.

Qualcomm: It is not correct only one PPW is activated. It is up to 4 which can be activated at a time. There is only one PPW activated per carier. We are not sure what the typical scenario is but they should be supported. To Ericsson, for the case we proposed, each PPW measure one layer. Within each window, one layer is measured.

Huawei: similar understanding as Qualcomm. The RAN1 agreement is for single PPW corresponding to single BWP. RAN1 agrees up to 4 which can be activated.

CMCC: Support to consider scenario with multiple frequency layers. RAN1 agree up to 4. About the scenario, in addition, there are another scenario the measurement is done under N and T value.

Nokia: we bebate on PRS processing window or PPW occasions. We should differentiate the number of PPW configured. We propose considering them in different issues.

Vivo: It is not very clear to me. Based on Qualcomm comment, one PPW is activated per carrier. On single carrier, there is only one PPW. I am not sure if there is something new to define.

Ericsson: We are not fine to define the requirements with multiple positioning frequency layers without clear understanding the sope.

**Issue 1-2-6: Applicability of PRS measurements without gaps under gap configuration/activation**

* Proposals
  + Proposal 1: QC
    - If the network configures/activates measurement gaps applicable for positioning measurements and activates PPWs simultaneously
      * Positioning measurements within measurement gaps are prioritized over measurements within PPW.
      * Measurement period requirement for measurements with gaps apply.
      * Measurement period for gapless measurements is extended by an unspecified amount of time.
  + Proposal 2: CATT, E///
    - For PRS measurement outside MG, the measurement requirements apply provided that no POS MG is activated during the measurement period.
  + Proposal 3: HW
    - RAN4 to define requirements for the scenario where one group of PFLs are measured outside MG while another group of PFLs are measured with MG: the total measurement delay is defined as the sum of measurement delays of each group.
* Recommended WF
  + Discussion needed

**Discussions:**

Qualcomm: our proposal is to prioritize the measurement within gap and gapless requirement is relaxed. For proposal #2, we are sure if it refer to specific gap or legacy gap. In our proposal, we think any gap can be used for positioning.

Nokia: we have commented for us we also look to the combination of gap and gapless. It is not clear to us for proposal 1 when the condition can be met. The combinations of modes has not been discussed so far. It is quite some effort needed if we want to achieve the combination. We want to discuss what we can get in Rel-17 and some other scenarios can be shifted to Rel-18.

Huawei: it is reasonable to consider where some is measured within the gap and others are measured outside gap. There is another which can be considered, i.e., inter-frequency layer. Proposal 2 preclude such case.

CATT: when we propose the proposal 2, the MG is pre-configured gap. We agree with Qualcomm. The legacy gap can be used. For scenario that Huawei mentioned, we are open.

Ericsson: on propsal 1, PPW and gap cannot be activated at the same time. Proposal 2 is fine. For proposal 3, why do we need mix two things.

Vivo: we also think use cases is not clear enough that network configure measurement with/without gap. If it has to be supported, we may consider simple case where PPW window is not overlapped with gap. The measurement with/without gap can be done separately.

Qualcomm: to Ericsson, is that PPW and gap cannot be activated at the same time captured somewhere? To Huawei, it is optimized scenario, which can be considred in future.

CATT: for proposal 3, we are open because RAN2 signaling can configure PPW and MG simultaneously. The case should be PPW and MG are configured simultaneous but are not collided to each other in time domain.

CMCC: we support considering the scenario. For the details of requirements, we are open.

Ericsson: to Qualcomm, it depends on what data will be provided. Only one will be activated. For CATT comment, PPW and MG can be activated at the different time. For proposal, we are not OK with “sum”. We are OK with the scenario where the PPW and MG are not colliding in time.

Nokia: If there is combination considered, we should have measurement delay impacting both type.

Qualcomm: If PPW and MG are not collided, in Rel-16 the only way to do is measurement within gap. Does it mean UE should do two measurement at a time? It is not feasible. That is the reason for our proposal 1. We should consider the processing load.

Vivo: in general, the simultaneous configuration PPW and MG is not feasible for UE to implement. It means that measurement within gap and outside gap should be done separately. It means uselss to configure both.

**Agreement:**

* For PRS measurement outside MG, the measurement requirements apply provided that no MG is activated during the measurement period.
  + Where MG includes pre-configured gap for positioning and any other measurement gaps used for positioning.
* FFS PRS measurement within gap.

**Issue 1-2-8: UE capability on M-sample for measurement with MG and outside MG**

* Proposals
  + Proposal 1: HW
    - RAN4 to introduce separate UE capabilities on M-sample for measurement with MG and outside MG.
* Recommended WF
  + Discussion needed

**Discussions:**

**Agreement:**

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**[104-e][226] NR\_pos\_enh\_2, AI 9.19.1.1, 9.19.1.3, 9.19.1.5, 9.19.1.6 – Qiuge Guo**

**R4-2214146 Email Discussion Summary for [104-e][226] NR\_pos\_enh\_2**

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

**Abstract:**

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

**Decision: Revised to R4-2214277**

**R4-2214277 Email Discussion Summary for [104-e][226] NR\_pos\_enh\_2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214492 | WF on NR Positioning Enhancements (Part 2) | CATT | Agreeable |
| R4-2214493 | Reply LS on the UE/TRP TEG framework | CATT | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211727 | R4-2214565 | CR on PRS measurement period requirements in RRC\_INACTIVE state | CATT | Agreeable |  |
| R4-2213259 | R4-2214622 | CR to 38.133 clarification on measurement period requirement in RRC\_INACTIVE state | Ericsson | Agreeable |  |
| R4-2213530 | R4-2214636 | CR on measurement period requirements with multiple Rx TEGs | Huawei | Agreeable |  |
| R4-2213535 | R4-2214638 | CR on PRS measurement requirements in INACTIVE | Huawei | Agreeable |  |

**GTW on Aug-17**

**Sub-topic 2-2 Performance requirements with TEG**

**Issue 2-2-2 Whether to define UE Rx-Tx accuracy and test case related to TEG?**

**Proposals**

* Option 1: (CATT, vivo)
  + Define relative UE Rx-Tx accuracy requirements and corresponding test cases for the case where two measurements are in same RxTx TEG.
* Option 2: (Huawei)
  + Do not define relative UE Rx-Tx accuracy requirements and related test cases
* Option 3: (Ericsson)
  + Define only absolute measurement accuracy requirement and test case for UE Rx-Tx time difference measurement
* Recommended WF
  + Need more discussion

**Discussions:**

Moderator: we can discuss the issue based on option 1 and option 2.

Vivo: We agree with CATT that we can derive the accuracy based on the results submitted last meeting. In Rel-16 we also derive the relative accuracy. The same approach can be reused here. For 2-2-3 we propose some approach.

Qualcomm: The propsal is not sufficient clear. According to CATT comment, we can leverage the RSTD results? This need be clarified. Which side condition are we going to use for the requirement? We suggest keeping discussion and clarify the assumption.

CATT: our proposal is to leverage the absolute RSTD simulation results. In our understanding, the applied side condition should be same as Rel-16: one cell is -6dB the other is -13dB.

Huawei: To CATT, we are going to define the relative RxTx accuracy, should we define it based on side condition with one cell is -6dB the other is -13dB? We are OK to define the relative accuracy with such side condition.

Ericsson: similar comment as Huawei.

Vivo: CATT suggestion is not clear to me. Why should we not use RxTx results?

CATT: Huawei understanding is correct. In Rel-16 we only have one cell measurement for RxTx. We only have one value for 90 pecentile.

Intel: CATT proposal is feasible. After checking results, the difference coming from -3dB and -6dB is comparable to margin. Considering the timeline, we can leverage the results even if the side condition is different.

Vivo: From our side, we have already had results for 5 pecentile. We can provide the corresponding result in this meeting. For RSTD approach, generally it is fine.

**Agreement:**

* Define relative UE Rx-Tx accuracy requirements and corresponding test cases for the case where two measurements are in same RxTx TEG based on side condition with one cell is -6dB the other is -13dB by using the absolute RSTD simulation results from Rel-16.

**Issue 2-2-3 How to define UE Rx-Tx accuracy related to TEG?**

**Proposals**

* Option 1: (CATT)
  + When defining relative UE Rx-Tx accuracy requirements related to RxTx TEG, the simulation results for RSTD measurement in R16 can be reused
* Option 2: (Qualcomm)
  + New simulations are required to derive UE Rx-Tx relative accuracy requirements for 90th percentile of absolute differential error
  + Frequency drift margin does not need to be added to the relative UE Rx-Tx accuracy requirements on the difference between two UE Rx-Tx measurements that belong to the same RxTx TEG
* Option 3: (vivo)
  + For the error from baseband of relative UE Rx-Tx time difference accuracy, the result of (95%-ile of UE Rx errors – 5%-ile of UE Rx errors) can be used.
  + The relative Rx-Tx accuracy can be defined as the sum of the error from baseband and the timing error margin.
* Recommended WF
  + Need more discussion

**Discussions:**

Huawei: to frequency drift margin, we have different view as Option 2. We should consider it as the same way as for Rel-16 RSTD requirement. Rx and Tx time are taken at the different points.

Qualcomm: We are doing UE Rx and Tx measurement separately. Tx and Rx time are separated by one subframe. That is different from RSTD. We first take difference locally and take the other difference.

CATT: to Huawei and Qualcomm, we would like to clarify whether the frequency drift is included in the report. In Rel-16 accuracy requirement is defined as base band error + timing error margin +frequency drift margin. This requirement should be defined as base band error + timing margin. Timing margin includes frequency drift.

Huawei: to CATT, we understand frequency drift only impact the relative measurement and is not included in any report. To Qualcomm, within each Rx and Tx measurement, the difference is small. But here we discuss the different RxTx report at the different time.

Qualcomm: we are OK to have time for discussion. Baseband + frequency margin. Maybe all the error can be absorbed in time error.

Huawei: everying including clarification and drift should be included in timing error. We need applicability rule.

Qualcomm: we agree with Huawei. For applicability of time error margin, we need discuss it.

**Issue 2-2-5 How to define the test case related to TEG?**

**Proposals**

* Option 1: (CATT)
  + Define applicability for the test cases related to TEG, i.e. the tests apply for the UE supporting TEG feature and reporting the same Rx TEG/RxTx TEG for the two cells.
* Option 2: (Huawei)
  + UE should not be mandated to use the same TEG to perform the measurement on both cells during the test.
* Option 3: (Ericsson)
  + Rel.16 setup can be reused to define test case for TEG based UE Rx-Tx measurement accuracy requirement.
  + Rel.16 setup shall be updated to support UE reported RxTx TEG margin value and UE is expected to meet the accuracy requirement corresponding to the RxTx TEG to pass the test.
  + Applicability rules for RxTx TEG accuracy requirement test case are not precluded.
* Recommended WF
  + Need more discussion

**Discussions:**

Moderator: we should try to reuse Rel-16 test with update. But companies comment this is optional feature.

Qualcomm: options are not exclusive. We support Huwei option. For option 3, this is a good approach. We can reuse the test. When UE reports TEG the additional requirement can be applied.

CATT: for option 2, if UE supports TEG feature, it is required by LMF. What is the UE beahvior? Should UE report TEG margin?

Ericsson: we confirm Qualcomm understanding on Option 3.

Huawei: to CATT, UE may or may not report TEG. It is up to implemetaion. If reporting, UE will report two measurements. It should be mandated. On Option 3, we also agree. The approach Option 3 can be applied to RSTD enh.

**Agreement:**

* UE should not be mandated to use the same TEG to perform the measurement on both cells during the test.
* For UE Rx-Tx test and RSTD enhanced accuracy test
  + Rel.16 setup can be reused to define test case for TEG based UE Rx-Tx/RSTD measurement accuracy requirement.
  + Rel.16 setup shall be updated to support UE reported RxTx TEG/Rx TEG margin value and UE is expected to meet the accuracy requirement corresponding to the RxTx TEG/Rx TEG to pass the test.
  + Applicability rules for Rx-Tx/RSTD accuracy test case are not precluded.

**Sub-topic 2-1 Timing error margin**

**Issue 2-1-2 Candidate timing error margin for RxTx TEG?**

**Proposals**

* Option 1: (CATT, Ericsson)
  + Reuse the candidate timing error margins of Rx TEG
* Option 2: (Huawei, MTK, Qualcomm, vivo)
  + (16 values): 1/2 Tc, 1 Tc, 2 Tc, 4 Tc, 8 Tc, 12 Tc, 16 Tc, 20 Tc, 24 Tc, 32 Tc, 40 Tc, 48 Tc, 64 Tc, 80 Tc, 96 Tc, 128 Tc.
* Option 2a: (Huawei)
  + The applicable timing error margin values that can be selected by the UE are the pre-defined values that are not larger than the sum of twice the Rel-16 group delay margin (dependent on PRS/SRS BW) and frequency drift margin
* Recommended WF
  + Need more discussion

**Discussions:**

Qualcomm: Option 2 has signaling impact.

Nokia: support Option 2.

**Agreement:**

* (16 values): 1/2 Tc, 1 Tc, 2 Tc, 4 Tc, 8 Tc, 12 Tc, 16 Tc, 20 Tc, 24 Tc, 32 Tc, 40 Tc, 48 Tc, 64 Tc, 80 Tc, 96 Tc, 128 Tc.
* The applicable timing error margin values that can be selected by the UE are the pre-defined values that are not larger than the sum of twice the Rel-16 group delay margin (dependent on PRS/SRS BW) and frequency drift margin
  + FFS on the frequency drift margin
  + FFS on “sum of twice the Rel-16 group delay margin and frequency drift margin”

**Sub-topic 1-2 Measurement in RRC\_INACTIVE state**

**Issue 1-2-1 PRS collision with PDSCH in RRC\_INACTIVE state**

**Proposals**

* Option 1: (CMCC, Huawei)
  + For PRS collision with PDSCH in RRC inactive state, in order not to miss paging, UE shall wait for receiving the PDSCH symbols other than retuning to PRS resources even the DCI is too close to the PRS symbols,
  + and the PRS measurement period can be extended when there is collision with PDSCH
* Option 2: (Qualcomm)
  + When the UE is performing positioning measurements in inactive state, if the UE determines that other higher priority DL signals/channels collide with PRS (as defined previously by RAN4) later than [N symbol/T ms] before the collision starts, the UE is not required to receive the other higher priority DL signals/channels and may receive the PRS resources (RAN1 conclusion)
* Option 3: (vivo)
  + If a PRS resource is within the initial DL BWP, when the time T between DCI and PRS resource is less than the DCI processing time, UE may receive the DL PRS symbols.
  + If a PRS resource is outside the initial DL BWP, when the time T between DCI and PRS resource is larger than the sum of DCI decoding time and RF retuning time, and scheduled PDSCH symbols do not collide with PRS, UE may receive the DL PRS symbols.
* Option 4: (Ericsson)
  + Depending on collision timeline (similar to gapless PRS measurement), a UE may continue receiving PRS over PDSCH or drop PRS over PDSCH on symbols carrying PRS in RRC\_INACTIVE state.
* Recommended WF
  + Need more discussion

**Discussions:**

Moderator: most companies are OK with Option 1. Others are based on RAN1 conclusion.

Vivo: RAN1 has made the agreement for connected mode measurement. In our view the same approach can be used in inactive mode. In inactive mode RF retuning is needed. We have almost the same behavior for connected and inactivated modes.

Qualcomm: we support Option 2, following RAN1 conclusion. Option 3 and Option 4 are aligned with the approach of Option 2. Vivo option is essential the same. The value N is not agreed by RAN1. We need wait for the decision on N value. Option 2, 3, 4 are similar. Option 1 is different from RAN1 approach.

Nokia: in our view, there are quite overlapping between options. Option 2 should be taken into account. Option 1 should be taken into consideration. We do not see too much conflict of option 1 with RAN1.

**Agreement:**

* Down-select to Option 1 and Option 2 and have further discussions.
  + RF retuning time is considered in Option 2.

**Issue 1-2-2 PRS measurement window in RRC\_INACTIVE state**

**Proposals**

* Option 1: (Qualcomm, vivo, Huawei)
  + Requirements for PRS measurement in INACTIVE apply provided that all PRS resources within a PFL are configured within up to [2] separate windows within TPRS, where each window is up to [5] ms.
* Option 1a: (vivo)
  + For the PRS measurement window in RRC\_INACTIVE state, the location of windows shall be close to paging occasion (i.e., after the paging occasion or before the paging occasion).
* Option 2: (Ericsson)
  + Do not define PRS measurement window in RRC\_INACTIVE state in Rel-17
* Recommended WF
  + Need more discussion

**Discussions:**

Moderator: we can compromise to Option 1 if the window is up to 10ms.

Ericsson: we consider option 1 is the new feature after the WI is closed. We do not want to define the window.

Qualcomm: Support option 1. Is there need to extend window only for single window or two separate windows.

Intel: option 1 is meaningful. From compromise, I want to check if the time duration is too long such that UE needs to keep on for long time and lead to more power consumption. Prefer to keep the value TBD or 5.

Huawei: to Ericsson, this is not new feature rather applicability. The power comsuption should be considered. We are fine with 10ms.

Vivo: support option 1 and fine with 10ms. If the location of window is not specified, it may not help to save the power. We propose option 1a where two window is closed enough.

CATT: we should also consider the network configuration.

**Agreement:**

* Requirements for PRS measurement in INACTIVE apply provided that all PRS resources within a PFL are configured within up to [2] separate windows within [Tavailable], where each window is up to [5 or 10] ms.
  + FFS on the location of windows.
  + FFS on whether there is impact on signalling

9.20 Multi-Radio Dual-Connectivity enhancements

9.20.3 Moderator summary and conclusions

**[104-e][227] LTE\_NR\_DC\_enh2, AI 9.20 – Jing Han**

**R4-2214147 Email Discussion Summary for [104-e][227] LTE\_NR\_DC\_enh2**

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

**Abstract:**

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

**Decision: Revised to R4-2214278**

**R4-2214278 Email Discussion Summary for [104-e][227] LTE\_NR\_DC\_enh2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214494 | WF on R17 further Multi-RAT Dual-Connectivity enhancements, | Huawei, HiSilicon | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211901 |  | Test case: Fast SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle | Apple | Agreeable |  |
| R4-2211902 |  | TS38.133 CR on SCG activation/deactivation | Apple | Agreeable |  |
| R4-2211903 |  | TS36.133 CR on SCG activation/deactivation | Apple | Agreeable |  |
| R4-2212055 |  | CR to maintain SCG activation delay requirements | OPPO | Not Pursued |  |
| R4-2212056 | R4-2214937 | DraftCR on TC11 for FR1 PSCell activation and deactivation delay in EN-DC tests | OPPO | Agreeable |  |
| R4-2212153 |  | Interruptions due to RRM measurements on deactivated SCG | Intel | Agreeable |  |
| R4-2212154 |  | Interruptions due to RRM measurements on deactivated SCG | Intel | Agreeable |  |
| R4-2212155 |  | EN-DC test cases for interruptions due to RRM measurements on deactivated NR PSCell in FR1 | Intel | Agreeable |  |
| R4-2212417 | R4-2214590 | Maintenance CR for fast scell activation on 38.133 R17 | MediaTek | Agreeable |  |
| R4-2212419 | R4-2214591 | Maintenance CR for SCG activation on 38.133 R17 | MediaTek | Agreeable |  |
| R4-2212420 |  | Test case for Fast SCell Activation of known SCell in FR1 for 640 ms SCell measurement cycle in EN-DC | MediaTek | Agreeable |  |
| R4-2212878 |  | CR on Efficient activation/de-activation mechanism for SCells | Nokia | Merged to R4-2212417 |  |
| R4-2212880 | R4-2214603 | CR on Efficient activation/de-activation mechanism for one SCG | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212881 | R4-2214604 | DraftCR TC#13 PSCell activation and deactivation delay | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2212979 |  | CR on A-TRS based SCell activation and deactivated delay requirements | Huawei, HiSilicon | Merged to R4-2212417 |  |
| R4-2212981 | R4-2214605 | Correction on efficient activation for one SCG | Huawei, HiSilicon | Agreeable |  |
| R4-2212982 |  | ATRS configurations for fast SCell activation | Huawei, HiSilicon | Agreeable |  |
| R4-2212984 |  | Test cases on fast SCell activation | Huawei, HiSilicon | Agreeable |  |
| R4-2212985 | R4-2214988 | Test case on efficient activation/de-activation mechanism for one SCG | Huawei, HiSilicon | Agreeable |  |
| R4-2212986 |  | Test case on Conditional PSCell addition and release | Huawei, HiSilicon | Agreeable |  |
| R4-2213016 | R4-2214611 | CR on SCG activation delay and intra-frequency measurement | vivo | Agreeable |  |
| R4-2213020 |  | Draft CR on test case for conditional addition and release of PSCell in FR1 EN-DC | vivo | Agreeable |  |
| R4-2213021 |  | Draft CR on test case for conditional addition and release of PSCell for FR2 SA | vivo | Agreeable |  |
| R4-2213045 | R4-2215004 | Draft CR to TS 38.133: Correction to conditional PSCell addition requirements (Rel-17) | vivo | Agreeable |  |
| R4-2213901 | R4-2214646 | Draft CR: Fast Scell activation delay interruption requirements and SCG activation delay requirements | Ericsson | Agreeable |  |
| R4-2213929 |  | Draft CR: Fast Scell activation delay interruption requirements and SCG activation delay requirements | Ericsson | Merged to R4-2212417 |  |

**GTW on Aug-16**

**Issue 4-3: Whether to specify conditional PSCell change TC**

**Moderator’s note:**

1. TC for conditional PSCell **addition** are agreed to be specified.

2. No new conditional PSCell **change** requirements are specified in this WI.

* Proposals
  + Option 1(vivo): Given that conditional PSCell change includes both inter-frequency and intra-frequency measurements, RAN4 shall develop new test cases for conditional PSCell change based on the legacy tests for conditional handover.
* Recommended WF
  + Further discussion

**Discussions:**

Moderator: in Rel-16 there is no conditional PSCell change related test case specified. In Rel-17 we have no core requirement for it.

Vivo: support option 1. Actually according to justification, there is some leftover on Rel-16 for CPC. CPC does not simply for inter-frequency but also for intra-frequency. We see the necessity to specify test case for it.

Apple: We have concern on option 1. On top of inter-frequency, what is the point to have inter-frequency test. There are many many test cases already.

Huawei: We think when we discuss CPC core requirement we think from UE perspective UE cannot see it is inter-or intra CPC. That is why there is no new requirement in the WI. Since there is no core it is straightforward to have no test.

Vivo: it does not means it is out of scope. We can see the current CHO both inter-frequency and intra-frequency test cases are defined.

**Issue 1-1: Additional****condition for scenario #3**

Background

The below agreement is achieved in RAN4#102e. The only open issues is whether add one additional condition.

|  |
| --- |
| **Scenario #3: SCell to be activated belongs to FR2, if there is no active serving cell on that FR2 band, and target SCell is known to UE.**  Assuming PDCCH TCI and PDSCH TCI (when applicable) shall be associated with the triggered temporary RS burst:  if semi-persistent CSI-RS is used for CSI reporting, Tactivation\_time is 3ms + max (Ttemp\_RS+ 2ms, Tuncertainty\_SP)  if periodic CSI-RS is used for CSI reporting, Tactivation\_time is max (Ttemp\_RS + 5ms, Tuncertainty\_RRC + TRRC\_delay-THARQ)  under the condition that  One of the candidate TCI states configured in TCI-StatesPDCCH-ToAddList has the same QCL source of the triggered A-TRS,  The QCL source of CSI-RS for CQI reporting is the same as the triggered A-TRS,  The TCI state for PDCCH/PDSCH that is the same as A-TRS is assumed during SCell activation until changed by network after SCell activation.  **FFS**: whether add one additional condition:   * + UE receives the SCell activation command and TCI state activation command at the same time. |

* Proposals
  + Option 1(Apple, MTK, Huawei): Add one additional condition
    - UE receives the SCell activation command and TCI state activation command at the same time.
  + Option 2 (Nokia, Ericsson): Allow the UE the additional activation time for receiving the TCI state activation command if not provided in the same MAC command as the SCell activation command.
* Recommended WF

Further discussion

**Discussions:**

Nokia: what we proposed here is to follow what we defined cell activation/deacation for legacy. We do understand it is for the first Scell activation. The fast activation is always benefit. It does not mean we should not define the requirement when the commands do not arrive the same time.

Apple: one different from legacy is the it is reply on L1 measurement. Tempoary RS is used. We do not see the reason.

Huawei: we understand the motivation. We have had agreement that we do not consider uncertainty of MAC. The reason is to save the additional delay. We support option 1.

Qualcomm: we share the similar views as Apple and Huawei. The payload is significantly high for RAN2 new IE. Why does network not send the IEs simultaneously. We support Option 1.

Nokia: I fully agree the purpose to speed up. However it seems strange that if network cannot send the signaling the same time then there is no requirement for UE.

Qualcomm: We do not need preclude this scenario from core requirement. At least we should consider condition in the test cases.

Huawei: does the tentative agreement means that we need add back MAC delay.

Mediatek: we have concern on it. It seems we go back.

Nokia: I does not fully see the reason not to define.

Mediatek: here we use the temporary RS. UE does not need to wait for TCI indication of PDCCH and PDSCH.

Qualcomm: no matter what is written, if we look at all the agreements, UE needs to active at one shot. From UE behaviour, there is no ambiguity.

**FFS on the following bullets:**

* whether or not to preclude the scenario where UE does not receive the SCell activation command and TCI state activation command at the same time.
* In the test case, only consier the condition that UE receives the SCell activation command and TCI state activation command at the same time

**Issue 2-6: Relax measurements on inter-frequency configured by SCG when SCG is deactivated**

* Proposals
  + Option 1 (Apple, MTK, vivo): Use the parameter measCyclePSCell to relax measurements on inter-frequency configured only by SCG when SCG is deactivated
  + Option 2 (Ericsson): No, RAN4 shall keep the new introduced parameter measCyclePSCell within agreed scope
* Recommended WF
  + Further discussion

**Discussions:**

Mediatek: inter-frequency is configured only by SCG. It is reasonable to relax the requirement, since the PSCell change… If we do not relax inter-frequency, then the inter-frequency measurement would be faster than intra-frequency which is wiered.

Ericsson: we would like to clarify there is deactive PScell there is only deactivated SCG. There is no agreement on inter-f relaxation when we introduce the requirement. The timer is kept running. The relaxation on inter-frequency will impact the performance for mobility. We do not support the relaxation at the late stage of Rel-17.

Vivo: in general we support option1. RAN4 needs ask for RAN2 to clarify the scenario if RAN4 agree option 1.

Nokia: it is clear whether the measCyclePScell is used for measurement of SCG.

Mediatek: we use the maximum value of measurement cycle of PSCell to replace the maximum value of …DRX cycle and STMC measurement period.

Apple: Support option 1. We consider the reasonable power saving. The relaxation is only for inter-f for SCG. Inter-f for MCG can guarantee the mobility. For vivo, it is duable.

Qualcomm: support option 1. We agree it is a bit late stage. From our side, it comes from all the companies. We want to equally relax the measurement configured for SCG. UE mobility is important. UE will know the situation based on measurement. UE won't lose the connect and do proper measurement.

Huawei: there is many way (DRX) for network to let UE relaxe the measurement.

Mediatek: if we use DRX, DRX is also be used for deactived PSCell. It reduces flexilbilty.

Ericsson: We have another concern. WE do not discuss the relaxation requirement. It is new requirement. It is not good idea to introduce the new requirement at this stage. Huawei points out there is another way.

Nokia: Agree with Ericsson and Qualcomm. It is a bit late. But this is something we overlooked. It is easy to relax but we have no full study it.

Apple: the simplest way is to replace the DRX with measCyclePSCell.

Ericsson: I did not really get it. Inter-f is the layer of active of PSCell. We are no comfortable to relax the requirement. The performance cannot be guaranteed. There would be deadlock between RAN2 and RAN4.

Mediatek: about the performance impact, any relaxation will lead to performance loss but the intention of WI is for power saving. About the deadlock, we do not quite get it.

Huawei: as the WI is completed in two meetings ago, some kind of enhancement. Could we suggest if we cannot reach agreement in the next meeting, then we won’t introduce the relaxation. If companies want it, we can discuss it in Rel-18 TEI or new WI.

Qualcomm: Apple makes the good point. Although the core part is completed, there is no impact on other WG. The workload on RAN4 is low.

**Chair=>** Encourage experts to address the issues as soon as possible. If there is no consensus by next meeting, suggest to discuss it in Rel-18.

**Issue 2-7: Change on measCyclePSCell range**

* Proposals
  + Option 1 (Ericsson): allow the value range of measCyclePSCell to be set from 80ms to 1280ms
  + Option 2 (Apple, Huawei, vivo): keep the low bound 160ms for measCyclePSCell.
* Recommended WF
  + Further discussion

**Discussions:**

Moderator: we discussed the issue for long time. The previous LS was sent out. We do not need reopen the discussion.

Ericsson: the reason is at that time we guarantee the sync condition but there is no guarantee on the DL synchronization. UE is not required to monitor SSB with longer cycle. We should maintain the DL sync. This is something that we can configure. We just want to allow the flexibility.

Qualcomm: we do not fully get point. When UE wants, UE can receive SSB.

Apple: We have concern on option 1. Similar comment as Qualcomm. Even if we follow logic, any value larger than 160ms cannot guarantee the sync. RAN4 had agreement. Unless critical issue identified we do not need to revisit it.

Vivo: we agree with moderator suggestion. We do not need reopen the discussion. Vivo have proposed 320ms and we accept 160ms as trade-off in the previous discussions.

Nokia: even though we proposed the shorter one before, we support Ericsson proposal. For the sake of process, we can stick to the existing one and we can discuss it later in the later release.

Huawei: To ericsson, we do not observe the strong relation between cycle and DL sync. UE can maintain DL sync based on SSB and SSB is always transmitted. When longer DRX is configured, there is no sync issue.

**Conclusions: No consensus on the change of lower bound. No discuss is expected in future meetings.**

**Agreement:**

* keep the low bound 160ms for measCyclePSCell.

**Issue 2-3: Tsearch in RACH-based PSCell activation delay**

**Background**

In RAN4#103e meeting, the below open issue is captured in WF [R4-2210605]:

|  |
| --- |
| **<Way forward>**: **Issue 2-1-4: Tsearch in RACH-based PSCell activation delay**   * + Option 1(Nokia, Ericsson): For RACH based PSCell activation, or if bfd\_and\_RLM is not configured for the deactivated PSCell, if the target cell is a known NR FR2 PSCell, Tsearch = 0 ms. If the target cell is an unknown FR2 PSCell and Es/Iot ≥ -2 dB, then Tsearch = 24\* Trs ms.   + Option 2(Qualcomm, vivo, Huawei, Apple, MTK, OPPO): No need to add the yellow highlight part. |

(**Moderator’s note:** the yellow highlight is added compared to the legacy requirement)

* Proposals
  + Option 1(Apple, Huawei, vivo): There is no necessity to explicitly add the yellow part (*bfd\_and\_RLM is not configured for the deactivated PSCell*) to RACH based PSCell activation in the spec.
  + Option 2 (Nokia): For RACH based PSCell activation, if the target cell is a known NR FR2 PSCell or if RLM and BFD are configured and TCI state is known, Tsearch = 0 ms. ~~If~~Otherwise the target cell is an unknown FR2 PSCell and Es/Iot ≥ -2 dB, then Tsearch = 24\* Trs ms.
* Recommended WF
  + Further discussion

**Discussions:**

**Agreements:**

### 9.21 Enhanced IIoT and URLLC support

#### 9.21.4 Moderator summary and conclusions

**[104-e][228] NR\_IIOT\_URLLC\_enh, AI 9.21.1 and 9.21.2 – Lars Dalsgaard**

**R4-2214148 Email Discussion Summary for [104-e][228] NR\_IIOT\_URLLC\_enh**

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

**Abstract:**

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

**Decision: Revised to R4-2214279**

**R4-2214279 Email Discussion Summary for [104-e][228] NR\_IIOT\_URLLC\_enh**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214338 | WF on NR\_IIOT\_URLLC\_enh | Nokia, Nokia Shanghai Bell | Agreeable |
| R4-2214339 | Collection of simulation result for NR\_IIOT\_URLLC\_enh | Nokia, Nokia Shanghai Bell | Noted |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2212156 |  | draftCR to clarify timing reference point for UE UL timing test cases | Intel | Endorsed |  |
| R4-2212902 | R4-2214700 | UE Rx-Tx time difference delay PDC test based on PRS/SRS | Ericsson | Agreeable |  |
| R4-2212903 | R4-2214701 | UE Rx-Tx time difference accuracy PDC test based on PRS/SRS | Ericsson | Agreeable |  |
| R4-2213049 |  | CR to TS 38.133 Correction to measurements requirements for PDC | vivo | Noted |  |
| R4-2213553 | R4-2214524 | CR on requirements for UE Rx-Tx measurement for PDC | Huawei, HiSilicon | Agreeable |  |
| R4-2213554 | R4-2214726 | CR to introduce TRS RMC for PDC tests | Huawei, HiSilicon | Postponed |  |
| R4-2213556 |  | CR on PDC measurement accuracy requirements | Huawei, HiSilicon | Agreeable |  |
| R4-2213557 | R4-2214727 | CR to introduce TC#2 for PDC measurement | Huawei, HiSilicon | Agreeable |  |
| R4-2213657 |  | CR on reporting mapping for URLLC in TS 38.133 | MediaTek | Agreeable |  |
| R4-2213863 | R4-2214728 | draftCR on test cases for UE Rx-Tx time difference measurement with PRS for RTT-based PDC in FR1 SA | Nokia, Nokia Shanghai Bell | Agreeable |  |

.

**GTW on Aug-22**

**Topic #2: RRM performance requirements**

**Issue 2-1: Shall** **RAN4 define accuracy requirements for PRS and TRS based Rx-Tx in fading channel conditions**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussions:**

Ericsson: we support option 1. We don’t have fading requirements for BS. Some cases could have fading environment.

Nokia: we also provided fading results. They are quite different. We are fine to go with option 2.

Vivo: there is no accuracy requirements for gNB on fading channel. For PDC, both gNB and UE requirements are covered so maybe it is safe that we go with option 2.

**Agreement:**

RAN4 does not define accuracy requirements for PRS and TRS based Rx-Tx measurements in fading channel conditions.

**Issue 2-4: Each TC, include sub-tests for two different PRS/TRS BWs**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussions:**

Qualcomm: positioning is different from this usecase. For PDC there is no capability to indicate the supported BW. We only need to have the largest supported BW tested.

Vivo: the accuracy requirements are different for different BWs. We could compromise to only one BW.

Huawei: to simplify the test we can also compromise to option 2.

**Agreement:**

For each TC, specify single PRS/TRS BW for PRS and TRS based Rx-Tx measurements per test configuration.

**Issue 2-5: Define new TRS RMC with 24 RB for 15k and 30kHz SCS, and 32 RB for 120kHz SCS**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussions:**

Huawei: since we agreed signle BW it should be the BW same as BWP BW. The new RMC is not needed in this case.

**Topic #1: RRM core requirement maintenance**

**Issue 1-3~1-6: PDC measurement period if PRS measurements occasionally/continuously collide with Type 1A/1B PPW/Type 2 PPW**

* Proposals
  + Option 1: PDC measurement period is extended for occasionally colliding cases while no measurements requirements for PDC are defined for continuously colliding cases.
  + Option 2: Other.

Moderator suggests in the 2nd round:

Confirm following agreement for Issues 1-3 – 1-6:

* If PDC RS resources overlap with Type 1A/1B/2 PPW the UE is allowed longer measurement period for PDC measurements if the PRS has higher priority than CSI-RS or PRS used for PDC measurements.

**Discussions:**

Ericsson: reuse as much as possible measurement gaps is our preference. PDC measurements are not gapless measurements. Is it PDC measurements using gaps colliding with PPW?

Qualcomm: this is collisions between PDC measurements and PPW for PRS measurements. PDC measurements do not need gaps since the target RS is in the active BWP. RAN1 has not defined priority for PRS in PPW and PRS used for PDC but only between PRS in PPW and CSI-RS for PDC. We can assume CSI-RS and PRS used for PDC measurements have same priority.

Vivo: do we need to combine two R17 features in the discussion? Need to double check on the priority between PRS and PRS.

Huawei: we need to consider the collisions. PDC RS is the same priority with other serving cell measurement RS.

Ericsson: it seems that this is RAN1 work instead of RAN4. If we allow longer measurement periods, random delay is added. we should avoid uncertainty in the requirements for measurements.

Qualcomm: RAN4 needs to identify the invalid configuration. RAN4 specifies the corresponding requirements.

**Issue 1-2: Introduction of a scaling factor if the PDC-RS collides with a measurement gap**

* Proposals
  + Option 1: Introduce a scaling factor Kgap, to account for overlap between PDC RS and MG.
  + Option 2: Allow for additional delay if there is any overlap between PDC RSs and MG’s.
  + Option 3: Do not define requirements if there is any overlap between PDC RSs and MG’s.
* Recommended WF
  + 3 different proposals have been proposed regarding how to address if there is overlap between PDC RS and a measurement gap.
  + All proposals support that as minimum RAN4 need to account such scenario in the requirements (i.e. an overlap occur).
  + Moderator propose to initially agree that RAN4 need to define requirements that account a possible overlap between PDC RS and a measurement gap.
  + How to account such overlap in the requirements should be discussed together with Sub-topic 1-3.
  + Moderator propose following agreement:
    - Agree that RAN4 need to define requirements that account a possible overlap between PDC RS and a measurement gap.
    - How to account such overlap in the requirements (options 1-3) will be discussed together with Sub-topic 1-3.

**Discussions:**

Nokia: we support option 1.

Vivo: if we go with option 1, normal mreaurements are also impacted. Our preference is option 2. We already have measurement restrictions between PDC and L1 measurements. Kgap is not clear since the PDC measurements still collide with other L1 measurements.

**Tentative Agreement:**

Introduce a scaling factor Kgap, to account for overlap between PDC RS and MG.

### 9.22 NR Sidelink Relay

#### 9.22.3 Moderator summary and conclusions

**[104-e][229] NR\_SL\_relay, AI 9.22 – Roy Hu**

**R4-2214149 Email Discussion Summary for [104-e][229] NR\_SL\_relay**

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

**Abstract:**

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

**Decision: Noted.**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214340 | BigCR for R17 NR\_SL\_relay tests | OPPO | Email approval |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2212057](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212057.zip) |  | CR on applicability rule for NR\_SL\_relay test cases | OPPO | Merged |  |
| [R4-2212058](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212058.zip) | R4-2214511 | CR on TC for Selection\_Reselection of sidelink relay UE | OPPO | Agreeable |  |
| [R4-2213493](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213493.zip) |  | DraftCR on applicability rule and reference configurations for NR sidelink relay tests | Huawei, HiSilicon | Agreeable |  |
| [R4-2213494](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213494.zip) |  | DraftCR on test cases of interruption requirements for NR sidelink relay | Huawei, HiSilicon | Agreeable |  |

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### 9.23 NR small data transmissions in INACTIVE state

#### 9.23.3 Moderator summary and conclusions

**[104-e][230] NR\_SmallData\_INACTIVE, AI 9.23 – Aijun Cao**

**R4-2214150 Email Discussion Summary for [104-e][230] NR\_SmallData\_INACTIVE**

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

**Abstract:**

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

**Decision: Revised to R4-2214280**

**R4-2214280 Email Discussion Summary for [104-e][230] NR\_SmallData\_INACTIVE**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214341 | Wayforward on RRM requirements and test cases for NR SDT | ZTE | Agreeable |
| R4-2214342 | LS on CG-SDT (re)configuration in RRC\_INACTIVE state for NR SDT | Ericsson | Withdrawn |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2212192](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212192.zip) | R4-2214515 | CR on T1 definition of TA validation for Rel-17 NR SDT in INACTIVE sate | LG Electronics Inc. | Agreeable | Focus on T1 definition update |
| [R4-2213559](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213559.zip) | R4-2214525 | CR on SDT RRM requirements | Huawei, HiSilicon | Agreeable | T1 definition update merged into Revision of R4-2212192. |

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**GTW on Aug-19**

**Topic #1: Maintenance of RRM core requirements for NR SDT**

**Issue 1-3-1: Should the sub-bullet for T1 definition, i.e., [If TAC command is not received while in RRC Innactive, T1 is the time when the latest RRCRelease is received] be confirmed?**

* Proposals
  + Option 1: Yes
  + Option 2: No
* *Tentative agreement sfrom moderator:*
* *For Issue 1-3-1, two votes for Option 1, five votes for Option 2, and one vote for the need of more input from RAN2 with one concern on what MO UE to measures RSRP. One case is raised that if the RRCRelease for the transition from RRC\_CONNECTED to RRC\_INACTIVE does not contain a CG-SDT configuration, then another RRCRelease with CG-SDT configuration should be issued in RRC\_INACTIVE, and moreover in this case, if there is no TAC received, then T1 is the moment when receiving the RRCRelease with CG-SDT configuration. In Moderator’s reading, this case is not covered even if we confirm the sub-bullet. Another RRCRelease with an updated CG-SDT configuration (e.g., BWP change) in RRC\_INACTIVE is possible as well. Therefore, Moderator suggests* 
  + *not to confirm the sub-bullet*
  + *align understanding on RRCRelease with CG-SDT configuration issued in RRC\_INACTIVE state for CG-SDT transmission:*
    - *Case 1: No CG-SDT is configured in the RRCRelease when changing from RRC\_CONNECTED to RRC\_INACTIVE, therefore an RRCRelease with CG-SDT configuration is needed in RRC\_;*
    - *Case 2: A new CG-SDT can be configured via RRCRelease in RRC\_INACTIVE, e.g., the cause could be change of BWP etc.*
  + *decouple the T1 definition from what MO UE to measure RSRP within the first window for TA validation.*

*And focus on T1 definition wording based on the above suggestions in the second round.*

**Discussions:**

LGE: we have concern on case 1 and 2. RRCrelease cannot be provided in inactive state. Case 1 is not a valid case.

Nokia: we are not sure if case 2 exists.

MTK: we agree with Nokia. CG-SDT configuration is received only when the UE transits from connected to inactive. We need a feedback from RAN2 regarding case 1 and 2.

Huawei: case 1 is valid. It is possible that the UE receives RRCrelease together with CG-SDT configuration. RA-SDT TA can be used by CG-SDT.

Qualcomm: CG has priority over RA.

ZTE: CG-SDT can be configured together with RRCrelease. We need to update the spec.

Apple: in case 1 UE goes to normal inative and does not transmit SDT. Case 2 the UE receives SDT configuration before entering inactive mode.

Ericsson: we would like to further check with RAN2 on the valid cases. Maybe an LS is needed.

Nokia: we need to check with RAN2. Maybe update on the cases is needed.

LGE: we are fine to further check with the LS.

MTK: can we simply specify T1 as the time when RRCrelease is received?

**Issue 1-3-2: In RAN4’s understanding, in which RRC state transition can an RRCRelease with CG-SDT configuration be issued?**

* Proposals
  + Option 1: Only from RRC\_CONNECTED to RRC\_INACTIVE
  + Option 2: Both RRC\_CONNECTED to RRC\_INACTIVE, and RRC\_INACTIVE to RRC\_INACTIVE

**Discussions:**

**Agreement:**

**Issue 1-3-3: If the answer to Issue 1-3-2 is Option 2, then which RRCRelease with CG-SDT configuration should be the reference to T1 definition?**

* Proposals
  + Option 1: The first
  + Option 2: The latest

**Discussions:**

**Agreement:**

**Issue 1-3-4: Should TAC command in successfully completed RAR/MsgB in 2-step/4-step RA be considered in T1 definition in addition to that in MAC-CE ?**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussions:**

**Agreement:**

**Issue 1-4-1: Should RAN4 specify SDT requirements for NR-U?**

* Proposals
  + Option 1: Yes
  + Option 2: No

**GTW on Aug-25**

**Topic #1: Maintenance of RRM core requirements for NR SDT**

**Issue 1-4-1: Should RAN4 specify SDT requirements for NR-U?**

* Proposals
  + Option 1: Yes
  + Option 2: No

**Discussions:**

Nokia: this WI is already closed. It it too late to have this requirement. It is better to bring it to the plenary. It is better for us to do it when there is proper TU allocated.

Qualcomm: we support option 1. We think the requriemetn for NR-U reuses non NRU ones. The work load is minimum. Ericsson proposes solid TP.

MediaTek: the core is already closed. We are not fine to open the new discussion about NR-U. this discussion should not happen since the WID clearly focuses on the licensed carriers. The requirements can not be applied directly to NR-U.

Huawei: we also support option 2. For LBT it is new requirements compared to the non NR-U requirements.

Ericsson: we believe the feature can be supported according the WID. This requirement does not have impact on any other group. *“Focus of the WID should be on licensed carriers and the solutions can be reused for NR-U if applicable. ”* this feature is already supported by other WG. We should follow the approach we had for R16 NR-U requirements.

ZTE: Our preference is option 2. This item is closed. Let’s discuss it in the plenary. If the workload is minimum we can follow the working procedure we are ok to discuss it.

MediaTek: to Ericsson: the wording is clear. the requirements we specified for SDT do not apply for NR-U system.

Ericsson: to MTK, if you look at the comments there is no one objecting to introducing the requirements. If this is not part of the WI, why was NR-U mentioned in the description?

Qualcomm: NR-U has always suffered from situations. The WID is for all the WG. RAN4 is supposed to specify requirements. It is much beneficial for NR-U UEs.

Nokia: Our comment is not regarding merit or including or not. It is just procedural. We didn’t reply to the next issue since we didn’t consider to introduce it in the first place.

Ericsson: we are confining the item so we bring it. It is not fair to say that the reason we didn’t bring the reason because of not considering it.

### 9.24 Additional enhancements for NB-IoT and LTE-MTC

#### 9.24.7 Moderator summary and conclusions

**[104-e][231] NB\_IOTenh4\_LTE\_eMTC6\_RRM, AI 9.24.4 and 9.24.5 – Zhongyi Shen**

**R4-2214151 Email Discussion Summary for [104-e][231] NB\_IOTenh4\_LTE\_eMTC6\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214281**

**R4-2214281 Email Discussion Summary for [104-e][231] NB\_IOTenh4\_LTE\_eMTC6\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214343 | WF on RRM requirements for NB\_IOTenh4\_LTE\_eMTC6 | Huawei, HiSilicon | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2212965 |  | CR on maintenance of neighbour cell measurement for NB-IoT | Huawei, HiSilicon | Agreeable |  |
| R4-2213565 |  | Big CR on performance requirements for NB\_IOTenh4\_LTE\_eMTC6 | Huawei, HiSilicon | Email approval |  |
| R4-2212967 | R4-2214711 | DraftCR on test cases for HD-FDD intra-frequency neighbour cell measurement of NB-IoT R17 | Huawei, HiSilicon | Agreeable | Capture comments in 1st round |
| R4-2212968 | R4-2214712 | DraftCR on test cases for TDD intra-frequency neighbour cell measurement of NB-IoT R17 | Huawei, HiSilicon | Agreeable | Capture comments in 1st round |
| R4-2212969 | R4-2214713 | DraftCR on test cases for HD-FDD inter-frequency neighbour cell measurement of NB-IoT R17 | Huawei, HiSilicon | Agreeable | Capture comments in 1st round |
| R4-2212970 | R4-2214714 | DraftCR on test cases for TDD inter-frequency neighbour cell measurement of NB-IoT R17 | Huawei, HiSilicon | Agreeable | Capture comments in 1st round |

.

## 10 Rel-18 spectrum related WIs for NR

## 11 Rel-18 non-spectrum related work items and study items for NR

### 11.8 Requirement for NR FR2 multi-Rx chain DL reception

#### 11.8.4 Moderator summary and conclusions

**[104-e][233] FR2\_multiRx\_RRM, AI 11.8.3 – Qian Yang**

**R4-2214153 Email Discussion Summary for [104-e][233] FR2\_multiRx\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214282**

**R4-2214282 Email Discussion Summary for [104-e][233] FR2\_multiRx\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214344 | WF on FR2 multi-Rx RRM | vivo | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2213053 |  | Work plan for RRM requirement for NR FR2 multi-Rx chain DL reception | vivo, Qualcomm | Approved |  |

.

**GTW Aug-24**

**Work plan**

**R4-2213053 Work plan for RRM requirement for NR FR2 multi-Rx chain DL reception**

*Type: discussion For: Approval  
 Source: vivo, Qualcomm*

**Abstract:**

**Decision:** The document was **Approved**.

**Discussions:**

Qualcomm: it is not about mobility. This item is for 4layer MIMO. The UE supports two layers for each panel/direction. Extend this assumption to other reducation items is not our intension.

**RRM requirements**

**R4-2212688 Discussion on RRM requirements for FR2 multi-Rx chain reception**

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

**Abstract:**

**Proposal 1: Rel-18 multi-RX chain UE should be able to support both intra-cell and inter-cell operation with TRPs located within reasonable intercell distance.**

**Proposal 2: The scope of a RX chain architecture includes possible implementations and UE capabilities as below:**

**Multiple Antenna panel**

**Multiple Antenna panel + AGC**

**Multiple Antenna panel + AGC + front-end (time and frequency sync)**

**Multiple Antenna panel + AGC + front-end + Demod/RRM**

**Proposal 3: RAN4 can consider two options for beam management for UE with multiple RX chains**

**Option-(i) Reuse independent beam management concept (IBM) from Inter-band CA study**

**Option-(ii) define panel or RX chain specific behaviors with RX panel control signal for DL**

**Proposal 4: Study independent beam managements for different QCL-D sources with multiple TRPs, and also study other QCL channel property impacts of {average gain, delay shift and doppler shift} for multi-RX chain requirements.**

**Proposal 5: Study UE behaviors and capability of multiple RX chains regarding handling Rx signal level difference between two channels.**

**Proposal 6: Study UE RX capability receiving extended MRTD based on non-collocated mTRP deployment scenario.**

**Proposal 7: Possible scenarios supporting simultaneous reception using multiple RX chains needs to be clarified in Rel-18 WI scope, including:**

**RRM and Demod simultaneous processing capability**

**RRM and CSI simultaneous measurements and processing**

**PDCCH/PDSCH simultaneous RX**

**PDSCH simultaneous RX (basic for 4 layers)**

**PDCCH simultaneous monitoring for multi-DCI dual-TCI ( Depending on the UE simultaneous RX capability, RX scheduling restriction rules can be discussed.)**

**Proposal 8: RAN4 to revisit the FR2 SMTC use case for ‘L1 and L3’ measurements and ‘serving cell and non-serving cell’ to reduce measurement latency. Rel-18 FR2 multi-RX chain UE may be able to measure RSs simultaneously with different QCL-D sources or with different beam assumptions (i.e. narrow and wide beam assumption)**

**Proposal 9: Each TCI switching per RX chain is assumed to be independent in aspect of TCI switching delay. RAN4 to study if Rel-17 TCI switching delay requirements can be applicable as Rel-18 UE requirements with multi-RX chains.**

**Proposal 10: RAN4 to study if a UE with multiple RX chains tracks time and frequency per TCI when dual TCIs are activated per RX chain.**

**Proposal 11: Power saving can be additional requirements of UE with multiple RX chains.**

**Decision:** The document was **Noted**.

**Discussions:**

Apple:

Ericsson: we suggest that we could narrow down the scope in the WF. This is extension of R17 MIMO item. We could start from that.

Vivo: it’d be better we could agree on things in the WF. At least L1 measurements is in the scope of this WI.

MediaTek: on P1, how to capture the reasonable distance in the spec? we could start from intra cell case. On P2, we need to allow for different UE implementation. On P3, no new procedure or reporting will be introduced according to the WID. On P6 it is related to TD among different panels. On P8 it is difficult to control L1 and L3 on different panels in parallel.

Huawei: many issues are captured in the WF. But some are RF work. Some are out of scope of WI. We need to focus on the RRM requirements impact. L3 can be deprioritized.

Samsung: in general for P3, the conclusion for IBM cannot be borrowed. For interband CA if one chipset can implement two different shifters two directions can be achieved. But if there is only one panel we have problem receiving from different directions. It is also related to P7. On P5, it is RF work. We need to wait for the RF decision. On P11, RAN4 does not specify anything for power saving requirements.

OPPO: UE asuumption of BB architecture needs clarification.

Qualcomm: this item is mainly about RF work from our understanding. We need to draw a clear line between the scope in this item and the enahcnments for other features. UE needs 4 FFT to achieve 4lyaer MIMO.

ZTE: on P4, QCL-A/B/C is not in the scope. On P8, L3 measurement is in the scope. It has impact on the delay of L1 measurements. On P11, we are not sure power saving is in the scope.

CMCC: on P1, we support it. Both cases need to be supported in this item. For P8, we also support it. With sim DL reception from different directions, we can further check whether L1 and L3 measuremetns can be performed in parallel.

Xiaomi: on P1, we support that R17 is considered as the baseline. P5 is RF. For P6, we suggest not to further discuss it. For P8, L3 enhancement is based on the L1 outcome. We need to treat them differently. For P9, we agree with the independency. The separate TCI-state switching requirements should be applied.

Vivo: we should focus on the WF drafting. Regarding the WF, everything is based on the company input in the meeting. We need consensus on the priority.

### 11.9 Even Further RRM enhancement for NR and MR-DC

#### 11.9.4 Moderator summary and conclusions

**[104-e][234] NR\_RRM\_enh3, AI 11.9.1, 11.9.2 and 11.9.3 – Jerry Cui**

**R4-2214154 Email Discussion Summary for [104-e][234] NR\_RRM\_enh3**

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

**Abstract:**

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

**Decision: Revised to R4-2214283**

**R4-2214283 Email Discussion Summary for [104-e][234] NR\_RRM\_enh3**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214345 | WF on R18 eFeRRM | Apple | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211851 |  | Work plan for R18 Even Further RRM enhancement for NR and MR-DC WI | Apple, OPPO | Agreeable |  |

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**GTW Aug-23**

**Work plan**

**R4-2211851 Work plan for R18 eFeRRM**

*Type: Work Plan For: Agreement  
 Source: Apple*

**Abstract:**

**Decision:** The document was **Approved**.

**Discussions:**

Ericsson: we agreed to have two phases for SCell activation delay reduction. Can we reflect this agreement in the work plan?

Apple: it is difficult to tell when phase I will finish. Let’s discuss the phases and scopes if we have further agreements le’t capture it.

Ericsson: Good plan. Our understanding is to have at least 4 meetings before phase II.

**FR2 SCell activation delay reduction**

**R4-2211852 Preliminary discussion on FR2 SCell activation enhancement**

*Type: discussion For: Discussion* 38.133 v CR- rev Cat: (Rel-18)  
  
 *Source: Apple*

**Abstract:**

***Proposal 1: RAN4 starts the discussion of the R18 unknown FR2 SCell activation enhancement based on baseline FR2 SCell activation requirement in TS38.133 section 8.3.2. If needed, the other SCell activation cases, e.g., multiple SCell activation, direct SCell activation, PUCCH SCell activation and fast SCell activation, can be discussed after baseline case is completed.***

***Proposal 2: for unknown R18 FR2 SCell activation enhancement, RAN4 to discuss following L3 part enhancements:***

1. ***Beam sweeping factor reduction for L3 measurement***
2. ***Sample number reduction for L3 measurement/synchronization***
3. ***Remove or reduce L3 T/F tracking time (8 Trs)***

***Proposal 3: for unknown R18 FR2 SCell activation enhancement, RAN4 to discuss following L1 part enhancements:***

1. ***skip L1-RSRP measurement and use measurement result from L3 stage for L1-RSRP reporting, if L3 measurement and L1 measurement are using same RS or QCLed type D RSs***
2. ***Beam sweeping factor reduction for SSB based L1 measurement***

***Proposal 4: for unknown R18 FR2 SCell activation enhancement, RAN4 to discuss following fine timing tracking enhancements for TCI RS:***

1. ***skip fine timing tracking for SSB corresponding to the TCI state, if SSB timing from L3 measurement stage or SSB timing from L1-RSRP measurement stage can be reused***

***Proposal 5: for unknown R18 FR2 SCell activation enhancement, RAN4 to discuss following AP RS use cases:***

1. ***Use AP RS for L1-RSRP measurement if UE can indicate the completion of L3 stage or can indicate the readiness of L1 measurement***
2. ***Use A-TRS for fine timing tracking on SSB corresponding to the TCI state after TCI activation command***

**Decision:** The document was **Noted**.

**Discussions:**

Nokia: unknown cases are the most difficult ones for the UE to activate the SCells. Regarding P5, with APRS, does it mean network need to schedule additionally the RS?

Qualcomm: we have concern on the AP RS term. It is better to use AP CSI-RS. Network does not know fully about the time when it needs to schedule the RS. Whether the CSI-RS can be aperiodically triggered is questionable. It requires cross group discussion.

Ericsson: we are ok to prioritize SCell without intraband serving cell in FR2. We should not exclude other cases especially when there is serving cell using ATRS. Are APRS and ATRS are for different dedicated usages or they can replace each other.

Vivo: we support the phase approach. For L3 measurements, one factor is the fine tracking time, which needs further discussion whether it can be reduced. Regarding P3, to skip the L1 measurements has impact on the UE accurately use the beam info. We need to study the feasibility for skipping L1 measurements.

Qualcomm: to add, we need a baseline to have the discussion on enhancements/optimization. We want to reduce the delay from the beam switching mainly. For other aspects we need further confirmation on the motivation and feasibility.

Xiaomi: for P1, we can first discuss unknown cases. For P2, temporary RS can be used for L3 measurements. For P5, temporary RS for fast activation can be considered.

OPPO: On P3, it is a feasible way to reduce the delay. On P5, in R17 we have verified the feasibility of AP RS here we think we can still use APRS to reduce the delay.

Qualcomm: we need to be careful about the terminology here. Regarding whether RS used for AGC, UE needs to filter signals outside the BW. We currently do not support P5.

Apple: On APRS, we do not try to introduce anything new. Network can schedule AP CSI\_RS to UE for beam training. Periodic RS is resource consuming. In the WF we can revise the term from APRS to aperiodic CSI-RS. The UE lets the network know the timing for aperiodic RS. On cross group impact, we need to think about the approach. We may need to turn to signaling or other machnisms eg. Handshake. About the baseline, our plan is to use the existing requirements as the baseline. To Ericsson, we don’t preclude anything for now. To vivo, we are fine to further discuss considering different UE implementations. Regarding L1 measurements, the firstthing is whether there is relation between the RS used by L3 and L1 measurements. To Xiaomi, we are open to explore APRS for L3.

**FR1 – FR1 NR-DC**

**R4-2211853 Preliminary discussion on RRM for FR1-FR1 NR-DC**

*Type: discussion For: Discussion* 38.133 v CR- rev Cat: (Rel-18)  
  
 *Source: Apple*

**Abstract:**

***Proposal 1: For FR1+FR1 NR-DC, the number of serving carriers in RRM requirement is up to 6 NR DL CCs in total, with 1 UL in PCell, and 1 UL in PSCell.***

***Proposal 2: the following technical change are proposed for FR1+ FR1 NR-DC PSCell addition delay requirement:***

* ***For NR PSCell in FR1: Tprocessing is the SW processing time needed by UE, including RF warm up period. Tprocessing = 20 ms.***
* ***For NR PSCell in FR1: Tsearch is the time for AGC settling and PSS/SSS detection. If the target cell is known, Tsearch = 0 ms. If the target cell is unknown and the target cell Ês/Iot ≥ -2dB, Tsearch = 3\* Trs ms.***

***Proposal 3: For FR1+FR1 NR-DC case, no change is needed on existing PSCell release delay requirement.***

***Proposal 4: For FR1+FR1 NR-DC case, no change is needed on existing interruption requirement for NR PSCell addition/release.***

***Proposal 5: For FR1+FR1 NR-DC case, no technical change is needed on existing conditional PSCell addition requirement except some clarification in the spec.***

***Proposal 6: For FR1+FR1 NR-DC case, no change is needed on existing PSCell change requirement.***

***Proposal 7: For FR1+FR1 NR-DC case, no technical change is needed on existing conditional PSCell change requirement except some clarification in the spec.***

***Proposal 8: For RLM/BFD/CBD/L1-RSRP, the existing scheduling availability requirement for FR1 inter-band CA is used for FR1-FR1 NR-DC scenario.***

***Proposal 9:***

***For intra-frequency measurement without MG,***

* ***the existing scheduling availability requirement of UE performing measurements in TDD bands in FR1 inter-band CA case is used for FR1-FR1 NR-DC scenario.***
* ***No need to introduce scheduling availability requirement of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1 for FR1-FR1 NR-DC scenario.***

***For inter-frequency measurement without MG,***

* ***No need to introduce scheduling availability requirement of UE performing measurements in TDD bands for FR1-FR1 NR-DC scenario*** ***unless such requirement is introduced for FR1 inter-band CA.***
* ***No need to introduce scheduling availability requirement of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1 for FR1-FR1 NR-DC scenario.***

***Proposal 10:***

***For FR1-FR1 NR-DC scenario, FR1 PCC use 1st searcher, FR1 PSCC uses 50% of the 2nd searcher, and all the SCCs and inter-frequency layer without MG in both MCG and SCG use the other 50% of the 2nd searcher. The CSSF table is proposed as following.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Scenario* | *CSSFoutside\_gap,i for FR1 PCC* | *CSSFoutside\_gap,i for FR1 SCC* | *CSSFoutside\_gap,i for FR1 PSCC* | *CSSFoutside\_gap,i for FR2 PSCC* | *CSSFoutside\_gap,i for FR2 SCC where neighbour cell measurement is not required* | *CSSFoutside\_gap,i for inter-frequency MO with no measurement gap* |
| ***FR1 + FR1 NR-DC (FR1 PCell and FR1 PScell)*** | ***1+NPCC\_CSIRS*** | ***2×( NSCC\_SSB +Y+2xNSCC\_CSIRS)*** | ***2x(1+ NPSCC\_CSIRS) Note 2*** | ***N/A*** | ***N/A*** | ***2x(NSCC\_SSB +Y+2x NSCC\_CSIRS )*** |

***Proposal 11: For FR1+FR1 NR-DC case, no change is needed on existing CSSF within MG requirement.***

***Proposal 12:***

***For HO with PSCell from ‘FR1-FR1 NR-DC to FR1-FR1 NR-DC’ and ‘FR1-FR2 NR-DC to FR1-FR1 NR-DC’, the existing requirement in section 6.1.5.4 TS38.133 can be reused.***

***For HO with PSCell from ‘FR1-FR1 NR-DC to FR1-FR2 NR-DC’, the processing time in existing PSCell change delay requirement in section 6.1.5.4.2 TS38.133 shall be defined as following; but other parts in existing requirement in section 6.1.5.4 TS38.133 can be reused,***

* ***Tprocessing = 50 ms if SMTC of the target unknown PSCell is configured in targetcellSMTC-SCG-r16 but not configured in reconfigurationWithSync, otherwise, Tprocessing = 45 ms.***

***Proposal 13:***

***To cover SCG activation delay requirement for FR1+FR1 NR-DC, the following changes on existing requirement shall be added, and other parts in existing requirement in section 8.17.2 TS38.133 can be reused,***

* ***for RACH based PSCell activation, if the target cell is a known NR FR1 PSCell, Tsearch = 0 ms, and if the target cell is an unknown FR1 PSCell and Es/Iot ≥ -2 dB, then Tsearch = 3\* Trs ms.***
* ***In FR1, the PSCell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.***

**Decision:** The document was **Noted**.

**Discussions:**

Ericsson: one question on FR1 FR1 NRDC, do we only consider interband only or both?

Apple: so sar we only see the combo of interband NR-DC.

Ericsson: we confirm it is only interband NR-DC.

Qualcomm: EN-DC has intraband. But NR-DC does not. Is it correct understanding?

Nokia: we are aligned with the RRM scope. In this meeting we need to identify the impacted requirements.

Vivo: we are supportive with most of the proposals. Regarding HO with PSCell under FR1 – FR2 NRDC to FR1-FR1 NRDC. Scenario needs clarification.

Apple: we only consider FR1-FR1 inter band NR-DC in this work item. We agree with vivo that the text in the current WID is not clear enough. We are open to discuss about the processing time.

### 11.10 Further enhancements on NR and MR-DC measurement gaps and measurements without gaps

#### 11.10.4 Moderator summary and conclusions

**[104-e][235] NR\_MG\_enh2, AI 11.10 – Ato Yu**

**R4-2214155 Email Discussion Summary for [104-e][235] NR\_MG\_enh2**

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

**Abstract:**

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

**Decision: Revised to R4-2214284**

**R4-2214284 Email Discussion Summary for [104-e][235] NR\_MG\_enh2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214346 | WF on further enhancements on measurement gaps and measurements without gaps | MediaTek inc. | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2213651 |  | work plan for Further Enhancements on NR and MR-DC Measurement Gaps and Measurements without Gaps for RRM | MediaTek inc. | Agreeable |  |

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**GTW Aug-23**

**Work plan**

**R4-2213651 work plan for Further Enhancements on NR and MR-DC Measurement Gaps and Measurements without Gaps for RRM**

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

**Abstract:**

**Decision:** The document was **Approved**.

**Discussions:**

Ericsson: companies have different views on joint requirements scope. Can we define clearly the scope in the work plan? Update is needed once we have the clear scope.

Nokia: we agree with Ericsson. On the perf. Part it is good to record the start point of the perf. Part. We should allow for early start for perf. Part.

MTK: perf part plan is already agreed. It starts from Aug 2023.

Intel: same comment with MTK.

**Joint requirements**

**R4-2211742 Initial discussion on RRM requirements for combination of pre-MG, concurrent MGs and NCSG**

*Type: discussion For: Discussion  
 Source: CATT*

**Abstract:**

**Observation 1: The gap association configuration for Pre-MG and NCSG has already been supported by Rel-17 signaling. But some clarifications on the applicability should be made.**

**Proposal 1: RAN4 to update the definition of concurrent MGs as multiple activated gaps to include the Pre-MG.**

**Proposal 2: RAN4 to discuss whether to increase the maximum number of activated gaps in Rel-18 which was already supported from signaling perspective.**

**Proposal 3: The proximity condition and priority rules when colliding defined in Rel-17 can be reused. And for the proximity condition, only the activated gaps need to be considered.**

**Proposal 4: The measurement requirements with concurrent MGs defined in Rel-17 can be reused except that only activated gaps are considered when defining CSSF.**

**Proposal 5: RAN4 to discuss and define the requirements assuming that multiple Pre-MG can be configured and activated.**

**Proposal 6: Network controlled activation/deactivation and UE autonomous activation/deactivation mechanism defined in Rel-17 can be the starting point and it should be studied how to decide the gaps to be activated when multiple Pre-MGs are configured.**

**Proposal 7: The definition update of concurrent MGs to include NCSG and the maximum number of concurrent gaps including NCSG should be discussed and can be considered together with Pre-MG.**

**Proposal 8: The priority rules when colliding defined in Rel-17 can be reused for the combination of NCSG and concurrent MGs and the proximity condition should be revisited.**

**Proposal 9: The distance between two NCSGs can be defined as the time difference between the ending point of VIL2 of the first NCSG and the starting point of VIL1 of the second NCSG.**

**Proposal 10: The two NCSG occasions are considered colliding if they are fully or partially overlapping in time domain or the distance between the two occasions is equal to or smaller than [X]ms. X can be further discussed, e.g. [2 or 0]ms.**

**Proposal 11: The distance between NCSG and legacy gap can be defined as the time difference between the ending point of VIL2 of the NCSG and the starting point of MGL of MG when NCSG occurs earlier than the MG, or the time difference between the ending point of MGL of the MG and the starting point of VIL1 of NCSG when MG occurs earlier than NCSG.**

**Proposal 12: The NCSG occasion and legacy gap occasion are considered colliding if they are fully or partially overlapping in time domain or the distance between the two occasions is equal to or smaller than [Y]ms. Y can be further discussed, e.g. [2 or 0]ms.**

**Proposal 13: The measurement requirements with MG and with NCSG in existing specification can be reused separately.**

**Proposal 14: After the requirements for case 1 and case 2 are defined, the framework of concurrent MGs can be extended to general case and not to differentiate gap types (Pre-MG, legacy MG or NCSG).**

**Decision:** The document was **Noted**.

**Gapless measurements**

**R4-2211935 Discussion on measurements without gaps**

*Type: discussion For: Discussion  
 Source: CMCC*

**Abstract:**

Inter-frequency measurement without gaps

***Observation 1: according to TS 36.133, if UE is capable of interFreqNeedForGaps or interRATNeedForGaps, the measurement is conducted without gaps and without interruption.***

***Observation 2: for intra-frequency measurement without gaps when UE indicates ‘no-gap’ via intraFreq-needForGap, the existinng cell identification requirements, measurement period requirements, and scheduling availability specified in TS 38.133 9.2.5 can be resued.***

***Observation 3: the existing requirements, including Rel-15 inter-frequency measurement with gaps, Rel-16 inter-frequency measurement without gaps when SSB is completely contained in the active BWP of the UE, or Rel-17 inter-frequency measurement with NCSG, cannot be directly reused for inter-frequency measurement without gaps when UE indicates ‘no-gap’ via interFreq-needForGap.***

***Proposal 1: it is proposed that interruption is not allowed when UE reporting ‘NeedForGapsInfoNR'.***

***Proposal 2: for intra-frequency measurement without gaps when UE indicates ‘no-gap’ via intraFreq-needForGap, there is no spec impact (i.e. existing requirements on intra-frequency measurement without gaps can be reused).***

***Proposal 3: it is proposed to update the definition of SSB based inter-frequency measurements without measurement gaps to include the case when UE indicates ‘no-gap’ via interFreq-needForGap. The detailed update is proposed as following:***

|  |
| --- |
| TS 38.133  A measurement is defined as an inter-frequency SSB based measurements without measurement gaps (either legacy measurement gap or NCSG) for UE capable of *interFrequencyMeas-NoGap* provided  - the UE supports *interFrequencyMeas-Nogap-r16* [15], and  - the SSB is completely contained in the active BWP of the UE.  A measurement is defined as inter-frequency measurement without gaps if the UE indicates ‘no-gap’ via interFreq-needForGap for inter-frequency measurement.  For UE supporting *ncsg-MeasGapNR-r17* and indicating *NeedForNCSG-InfoNR* for inter-frequency measurement,  - An inter-frequency SSB measurement is defined as measurement without gap if  - the UE indicates ‘nogap-noncsg’ via *NeedForNCSG-InfoNR* for the inter-frequency measurement, and  - the SSB is not completely contained in the active BWP of the UE |

***Proposal 4: for SSB based inter-frequency measurements without measurement gaps when UE indicates ‘no-gap’ via interFreq-needForGap, it is proposed to take 9.3.10.3 as baseline to define scheduling availability, and futher discussion can be considered.***

***Proposal 5: for inter-frequency measurement without gaps when UE indicates ‘no-gap’ via interFreq-needForGap, it is proposed to specify cell identification (including PSS/SSS detection and time indec detection) and measurement period requirements by updating exsiting requirements (taking 9.3.4 or 9.3.10 as baseline).***

Inter-RAT NR measurements

***Observation 4: according TS 36.331 and TS 36.133, both NeedForGap (interRAT-NeedForGapsNR) and NCSG can be used for inter-RAT neasurement.***

***Observation 5: neither RRM requirements for inter-RAT NR measurement with NeedForGap nor RRM requirements for inter-RAT NR measurement with NCSG are specified.***

***Observation 6: from signaling point of view, neither NeedForGap nor NCSG are supported for EN-DC.***

***Proposal 6: for inter-RAT NR measurement when UE operating in LTE SA, it is proposed to firstly determine based on which mechanism to discuss inter-RAT NR measurements: NeedForGap (interRAT-NeedForGapsNR)? or NCSG? or both?***

* ***No matter which machanism is adopted, RRM requirements impact can be expected.***

***Proposal 7: For inter-RAT NR measurement when UE operating in EN-DC,***

* ***If SSB is completely contained in the active BWP of the UE, it is similar like Rel-16 inter-frequency measurement without MG, and the requirements in 9.3.9 can be used as baseline***
* ***If SSB is not completely contained in the active BWP of the UE, it is proposed to firstly determine based on which mechanism to discuss inter-RAT NR measurements: NeedForGap? or NCSG? or both?***
* ***No matter which machanism is adopted, both signalling impact and RRM requirements impact can be expected.***

Inter-RAT LTE measurements

***Proposal 8: for inter-RAT LTE measurement, it is proposed to consider following two cases:***

* ***Case 1: when LTE CRS to be measured is contained in UE’s active BWP***
* ***Case 2: when LTE CRS to be measured is not completely contained in UE’s active BWP, but there is spare RF chain***

***Proposal 9: for inter-RAT measurement without MG, including both inter-RAT NR measurement and inter-RAT LTE measurement, both same numerology and mixed numerology need to be supported.***

**Decision:** The document was **Noted**.

### 11.12 Air-to-ground network for NR

#### 11.12.5 Moderator summary and conclusions

**[104-e][236] NR\_ATG\_RRM, AI 11.12.4 – Shiyuan Wang**

**R4-2214156 Email Discussion Summary for [104-e][236] NR\_ATG\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214285**

**R4-2214285 Email Discussion Summary for [104-e][236] NR\_ATG\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214347 | WF on NR ATG RRM core requirements | CMCC | Agreeable |

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**GTW Aug-24**

**R4-2212696 Discussions on A2G RRM requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

A contribution discussing the RRM imapct of A2G work item.

**Decision:** The document was **Noted**.

**Discussions:**

CMCC: on P3 and 4, neighbour cell measurements can be reduced. We think neighbour cell measurements are still useful.

Ericsson: there are cases the UE needs to measure the neighbour cells. There could be sudden changes in the path and they are captured. We need to discuss when does the UE measure since the cells are really large. Frequent measurements do not make sense. In case the UE is not change cell it is better to reduce the measurements.

Apple: in general, do we always assume GNSS capability? On the other hand, do we need to consider feeder link delay?

CMCC: to Apple in the WF the tentative agreement is that GNSS should be assumed. Regardless TA conpensation feature the UE supports GNSS likely. On feeder link TAcommon is not applied to ATG since there is only the service link. TAcommon and kmac are not applied.

### 11.16 Further NR mobility enhancements

#### 11.16.4 Moderator summary and conclusions

**[104-e][237] NR\_Mob\_enh2, AI 11.16 – Miao Wang**

**R4-2214157 Email Discussion Summary for [104-e][237] NR\_Mob\_enh2**

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

**Abstract:**

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

**Decision: Revised to R4-2214286**

**R4-2214286 Email Discussion Summary for [104-e][237] NR\_Mob\_enh2**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214348 | WF on Further NR Mobility Enhancements | MediaTek Inc. | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| R4-2211550 | R4-2214660 | Work Plan for Further NR Mobility Enhancements | MediaTek Inc., Apple | Approved |  |

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**GTW Aug-24**

**Work plan**

**R4-2211550 Work Plan for Further NR Mobility Enhancements**

*Type: Work Plan For: Approval  
 Source: MediaTek (Shenzhen) Inc., Apple*

**Decision:** revised to R4-2214660.

**R4-2211550 Work Plan for Further NR Mobility Enhancements**

*Type: Work Plan For: Approval  
 Source: MediaTek (Shenzhen) Inc., Apple*

**Decision:** The document was **Approved**.

**FR2 SCell setup and resume**

**R4-2212869 Discussion on requirements of FR2 measurements for DC/CA setup/resume**

*Type: discussion For: Discussion* 38.133 v CR- rev Cat: (Rel-18)  
  
 *Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

**Observation 1: Fast DC/CA resume/setup enables data DC/CA usage with lower latency that improves user throughput.**

**Observation 2: Reduced DC/CA setup latency enhances load balancing between different cells/carrier frequencies and avoids congestion.**

**Observation 3: Reduced DC/CA setup delay contributes to lower user energy consumption by reducing the data transmission time and enabling faster release of the user to idle/inactive mode.**

**Observation 4: Based on RAN4 UE RRM requirement for FR2 operation assumptions, the user has one Rx panel active at a time. Additionally, the UE is allowed to sweep its receive panels/beams when performing measurements. This imposes an additional delay in FR2 compared to FR1 operation.**

**Observation 5: Idle-mode FR2 inter-frequency carrier measurement requirements may take more than 2.5 minutes (which is 8 times more than that of required for FR1).**

**Observation 6: Considering that the cell sizes are relatively small in FR2, 2.5 minutes measurement delay may contribute to sub-optimal DC/CA setup decision especially for mobile UEs.**

**Observation 7: EMR requirements apply only when timer T331 is running. When T331 expires, it is up to the UE implementation whether to perform idle-mode DC/CA measurement, and this is only possible if the measurement configuration is provided in SIB.**

**Observation 8: Inter-frequency DC/CA idle-mode measurement is supported for the users with capability of idleInactiveNR-MeasReport-r16 when serving gNB also supports idle mode CA/DC measurement reporting and it is the validity area.**

**Observation 9: Connected mode FR2 inter-carrier frequency measurement (even for one carrier frequency) may take up to 4160 msec.**

**Observation 10: Making network aware of an available FR2 cell in connected mode may take up to five times longer delay than what is required for FR1 which significantly delays FR2 DC/CA setup.**

**Observation 11: Additional measurement enhancements are needed to reduce secondary link (PScell/SCell) establishment and enhance the user experience while accounting user constraints.**

**Observation 12: Most of the offered load is transmitted from the PCell when SCell setup delays is long.**

**Observation 13: Reduction of the CA/DC setup delay helps in providing additional resources to the UEs faster when UE is entering connected mode.**

**Observation 14: With shorter setup delay we observe a reduction in UE energy consumption due to faster offload.**

**Observation 15: RAN2 has defined UE actions when receiving paging for MT-originating calls or triggering RRC connection establishment/resume for MO-originating calls.**

**Proposal 1: RAN4 to clarify that the “when UE has initiated access” is the point in time when RRC procedures in clauses 5.3.2.3, 5.3.3.2 or 5.3.13.2 are initiated.**

**To enhance FR2 measurements and thus reducing SCell/SCG setup delay the following solutions are proposed:**

**Proposal 2: Enable simultaneous use of EMR and Search threshold, i.e. UE can be requested to perform EMR even with the search thresholds.**

**Proposal 3: UE can be configured to perform FR2 cell measurements during connection setup (i.e. paging, RRC connection establishment, RRC connection resume).**

**Proposal 4: UE can be configured to maintain measurement configuration of previous serving cells for EMR purposes.**

**Decision:** The document was **Noted**.

**Discussions:**

Huawei: For P1, we think MT-o calls starts when UE receives paging and MO-o calls starts when UE performs RACH. For P2, what’s the method to enable simultaneous EMR and search threshold.

Vivo: for P1, we prefer to discuss directly on the starting point. We share the same view with Huawei. For P4, we are not clear about maintenance of measurement configuration.

CMCC: For P3, the impact on RRC setup/resume needs to be considered. It is not preferred if the delay is extended. We need to avoid it.

Apple: on P2, not clear on simultaneous operation. For P4, it means the UE needs to keep measuring previous serving cells.

Qualcomm: we agree that delay in FR2 is large. Particular for FR2, the side condition is key. If the network can provide some information for deployment, the UE can make use of it.

Ericsson: fast activation benefits are obvious. On P1 we agree. We need to agree on the scope first.

Xiaomi: for P1, we prefer to directly discuss the starting points. We share the same views with Apple and Huawei. On P4, we have concern. It is big burden for UE to maintain.

MediaTek: On P1, we agree with Huawei and vivo. On P2, it is stated in the WID that we should consider only during the RRC setup/resume procedure.

Qualcomm:

Nokia: On P1, it is good baseline to take the starting points. On P2, we are interested in any potential enhancements to reduce the delay. We are open to look at what network can further provide to the UE to help. On P3, the goal is not to add delay to the procedures. One usecase is that the UE is in FR1 and connection starts in FR1 and looks for the first band in FR2. On P4 we can continue discussion, our concern is that if the network really wants to save ppower consumption. On keep measuring previous serving cells, it is more like how network can assist the UE with info to reduce the delay. About the scope of the work, it is good question. The scope of the work is basically how we can assist the UE to enhance the delay as much as possible.

**L1/L2 based inter-cell mobility**

**R4-2212671 Discussion on potential RRM impacts in R18 L1L2 mobility**

*Type: discussion For: Discussion  
 Source: vivo*

**Abstract:**

**Observation 1 From RRM perspective, to specify requirements to support R18 L1/L2 mobility, RAN4 would need consider the following extensions to R17 inter-cell L1 measurements and R17 inter-cell TCI switching**

**Serving cell is changed, while**

**BWP of target cell can be either same (i.e. target cell is R17 CDP) or different from source cell.**

**The SSB frequency of source cell and target cell can be either same or different**

**The inter-cell operation can be applicable to both sync case and the async case between source cell and target cell.**

**For those UEs with higher capability, further discuss whether to support L1 measurements on more than 1 candidate cells per SSB frequency layer, whose timing difference can be larger than CP per frequency layer.**

**Observation 2 RAN4 would be responsible for providing the definition of ‘intra-frequency/inter-frequency’ in L1/L2 centric inter-cell operation, which is mentioned in the WID.**

**Proposal 1 RAN4 to start the discussion of RRM impacts of L1/L2 mobility early in R18, at least focus on the following**

**Define/Clarify the ‘intra-frequency/inter-frequency’ of inter-cell operation mentioned in the WID.**

**Further discuss the necessity, feasibility, and pros/cons for introducing ‘inter-frequency’ L1 measurements to support R18 L1/L2 mobility.**

**Further discuss the case when Rx timing difference between different candidate cells on the same frequency layer is larger than CP, is supported by UEs with higher capability in R18 or not.**

**Decision:** The document was **Noted**.

**Discussions:**

Huawei: to clarify on ob1 and 2, BWP cases need to be considered. Could you clarify on the UE behaviours whent the BWP of the target and serving cells are different. We need to discuss the definition of the intra and inter frequency. Whether there is relationship between the two Wis?

CMCC: for p1, does it mean that the definition needs to be changed? We think we can reuse existing ones. According to the WID, both inter and intra frequency operations are needed. Whether the feasibility study for inter-frequency L1 measurements is RAN2 work?

Ericsson: we agree with CMCC that inter-frequency is already in the WID. We don’t have to have the feasibility study in RAN4. L1/2 mobility is supposed to include inter-frequency operations.

Apple: in general, it is early to conclude on anything. The handover procedure is not clear yet in RAN2. It is challenging for RAN4 to decide on the synchronization. We need to wait for RAN1/2 input.

Qualcomm: maybe we need to define different terms than intra/inter frequency for L1 measurements on the non serving cells. Regarding sync, the scenario we should assume sync environment.

Nokia: on RTD and CP, we are discussing mobility. So UE is moving between cells. For L3 we don’t have restriction on CP. We expect that the RTD can be larger than CP in this context.

Vivo: to Huawei on BWP, at least it covers the interfrequency cases. NCD-SSB was introduced for RedCap. We are open to discuss it in R18. Regarding CMCC and Ericsson, inter-frequency L1 measurement is not explicitly in the WID. Clarification is needed. To QC and Apple on sync, we share the same view that it depends on the input from other groups. To Nokia, we agree that UE with higher capability, RTD larger than CP can be supported.

**CHO and CPAC**

**R4-2213014 Preliminary discussion on CPAC with subsequent CPC and CHO with candidate SCGs for R18 Further NR Mobility Enhancements**

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

**Abstract:**

**Proposal 1: If RAN4 would like to define delay requirements of R18 CPAC with subsequent CPC, how to the starting point of the 2nd time CPC needs further discussion.**

**-Option 1: from UE 2nd triggering the CPC;**

**-Option 2: using the legacy starting point and define the delay includes both the 1st time CPAC and subsequent CPC**

**Proposal 2: When CHO and associated CPA are executed simultaneously, the CHO delay with PSCell may need to be specified.**

**Proposal 3: Whether RAN4 needs to define requirements for non-simultaneous CHO and CPA depends on RAN2 progress.**

**Decision:** The document was **Noted**.

**Discussions:**

Vivo: for CPAC, we agree that we need to consider redefine the starting point. This case is only supported there is no CPAC config change before the 2nd time CPC. For CHO we are open to discussion case 2 and 3. For case 1 it is narrow case. We can consider that they are triggered within a certain time gap. One group waits until the criteria are fulfilled after the other one.

Apple: we are open on P1. Regarding CHO + CPAC we need to reuse the existing requirements as much as possible. Regarding simultaneous case, we need more time to consider the scenario.

Qualcomm: whole benefit from the feature is under mobility with predictable sequence. We have almost all the conponents in the existing spec already. Let’s focus on the things that are the most beneficial.

Huawei: on P1, we think if there is no updated info for the subsequent CPC, we need to specify the requirements. About option 2 we are open to use it as the starting point. We also agree that RAN2 is working on the details. On P2, we are open to consider the cases. We can wait for more RAN2 progress.

### 11.17 Dual Tx/Rx Multi-SIM for NR

#### 11.17.3 Moderator summary and conclusions

**[104-e][238] NR\_DualTxRx\_MUSIM, AI 11.17 – Xusheng Wei**

**R4-2214158 Email Discussion Summary for [104-e][238] NR\_DualTxRx\_MUSIM**

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

**Abstract:**

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

**Decision: Revised to R4-2214287**

**R4-2214287 Email Discussion Summary for [104-e][238] NR\_DualTxRx\_MUSIM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214349 | WF on RRM requirements for Rel-17 MUSIM gaps | vivo | Agreeable |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Status** | **Comments** |
| [R4-2213450](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213450.zip) |  | Work plan for Dual Transmission Reception (Tx Rx) Multi-SIM for NR WI. | vivo | endorsed |  |

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**GTW Aug-24**

**Work plan**

**R4-2213450 Work plan for Dual Transmission Reception (Tx Rx) Multi-SIM for NR WI.**

*Type: Work Plan For: Endorsement  
 Source: vivo*

**Abstract:**

**Decision:** The document was **Endorsed**.

**RRM scope**

**R4-2213451 Initial consierations on RRM requirements for Rel-17 MUSIM gaps**

*Type: discussion For: Discussion  
 Source: vivo*

**Abstract:**

**Proposal 1: All specification work listed in the 2nd item “Define RRM requirements for Rel-17 MUSIM gaps” are based on existing Rel-17 MUSIM gap patterns defined in Table 9.1.10-1 of [4] and based on corresponding RAN2’s signalling structure defined at Rel-17. All MUSIM gaps cannot be used by any measurements configured for network A and all network A measurements are carried out outside MUSIM gaps.**

**Proposal 2: Regarding network A measurement with measurement gaps or without measurement gaps, the corresponding measurement requirements on network A should be extended in order to address the impacts of MUSIM gaps due to the collision between MUSIM gaps with other gaps or occasions for measurement.**

**Proposal 3: when the MUSIM gap neither collides with any Rel-17 legacy gap nor collide with any SMTC/SSB or any resources for L1 measurement; or only MUSIM gaps are configured and the MUSIM gap does not collide with any SMTC/SSB or any resources for L1 measurement, network A measurement requirements can be reused.**

**Proposal 4: For the scenario where the MUSIM gap collides only with Rel-17 legacy gap, gap collision issue between MUSIM gap and Rel-17 legacy gaps should be solved firstly. For the gap collision rules, Rel-17 priority based gap handling rules can be considered as one possible solution besides other enhanced solutions.**

**Proposal 5: when MUSIM gap collides only with SMTC/SSB or any resource for L1 measurement, collision handling rules should be defined before measurement requirements specification.**

**Proposal 6: when MUSIM gap collides with both legacy gaps and SMTC/SSB or any resource for L1 measurement, the 1st step is to resolve the collision between gaps. After finishing gap collision handling, principles used for scenario 3 can be reused**

**Proposal 7: The necessity to define network B requirements should be discussed further. If there is a consensus to specify network B requirement, its priority should be lower compared with the work for network A requirements and could be carried out at the second phase in the WI time frame**

**Proposal 8: If there is a consensus on defining network B requirements, the following requirements are purposed to be defined for network B idle/inactive state. Requirements are not needed for other “best effort” based functions.**

**UE measurement capability**

**Measurement and evaluation of serving cell**

**Measurements of intra-frequency NR cells**

**Measurements of inter-frequency NR cells**

**Measurements of inter-RAT E-UTRAN cells**

**Maximum interruption in paging reception**

**Measurements for UE configured with relaxed measurement criterion**

**Proposal 9: In case 1, gaps to be considered include all gaps defined till Rel-17 including Pre-MG, NCSG, concurrent gap, ePos, gaps for NTN and legacy gaps for measurement.**

**Proposal 10: For gap collision case 1 and 3, priority based solution can be considered. Enhanced solutions on gap collision beyond priority based solution are also open for discussion.**

**Proposal 11: For priority based solution, priorities can be allocated to each gap patterns and when two or more gap collide, only the highest priority gap is kept and all other gaps are dropped.**

**Decision:** The document was **Noted**.

**Discussions:**

Ericsson: about collision, within MUSIM gaps it should not follow the concurrent gap rules. Different utility is with different MUSIM gaps. On MUSIM gap collision with other gaps, we prefer to consider MUSIM gap as a package and it fits in the legacy rules. On MUSIM gap collision with measurements we are fine with the priority but we think the group needs to discuss also HO on network A. it is missing in this meeting.

MediaTek: On P3, we don’t have to consider the cases where it is not impacted by MUSIM gaps. We need to consider when there is impact from MUSIM gaps. On the priority rule, it can be used as the baseline for collissions. It can be applied either as individual priority or group priority. Regarding the package of MUSIM gaps, we don’t think MUSIM gaps are handled as one gap when we handle the collision. Since MUSIM gaps aare for different functions.

Apple: we support the priority based collision handling solutions. Grouping multiple MUSIM gaps into one package is not always beneficial. Different MUSIM gaps are configured with different priority. If we group different patterns into the same group, it is difficult to apply the same priority.

Vivo: we agree with Apple that grouping package needs to be discussed further. We are open to discuss the concurrent gap priority. We think we could reuse it as much as possible. On P3 to MTK, our intentioin is to limit the scope of the item. We are ok to focus on the cases where MUSIM gaps make impact.

## 12 Rel-18 Work Items for LTE

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

#### 12.5.6 Moderator summary and conclusions

**[104-e][239] LTE\_NBeMTC\_NTN\_RRM, AI 12.5.5 – Hsuanli Lin**

**R4-2214159 Email Discussion Summary for [104-e][239] LTE\_NBeMTC\_NTN\_RRM**

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

**Abstract:**

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

**Decision: Revised to R4-2214288**

**R4-2214288 Email Discussion Summary for [104-e][239] LTE\_NBeMTC\_NTN\_RRM**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214350 | WF on LTE IoT NTN RRM requirements | MediaTek | Agreeable |

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**GTW Aug-24**

**R4-2212908 Discussion on RRM requirements for IoT NTN**

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

**Abstract:**

**The LTE\_IoT\_NTN work item defines several communication scenarios: LEO, GEO and MEO. These scenarios are significantly different, for example, in term of cell-coverage, round trip time, differential delay and max Doppler shift, which might impact on RRM core / Demodulation requirements. Additionally, the WID specifies that requirements for both eMTC and NB-IoT are to be defined.**

**RAN4 NTN work only considered LEO and GEO scenarios, but the TR 36.763 concluded that the enhancements from the NTN work are applicable to MEO as well.**

**RAN4 to develop RRM requirements for LEO and GEO scenarios. If needed, prioritize LEO**

**RAN4 to develop RRM requirements for both eMTC and NB-IoT devices over NTN.**

**RAN4 to consider the following list of requirements in the discussion of the scope of RRM requirements for IoT NTN:**

**RAN2 has agreed that the UE in discontinuous coverage deployment is not required to perform any cell search.**

**A new SIB32 was defined so that the ephemeris information for discontinuous coverage is shared with the UEs.**

**Define the RAN4 requirements based on the assumption that the UE is able to predict the coverage.**

**In IDLE mode or PSM mode, the UEs are not required to perform any cell search while out of coverage in discontinuous coverage.**

**Decision:** The document was **Noted**.

**Discussions:**

Qualcomm: there are 3 meetings for this item. There are useful features for NB-IoT/MTC but how many are they included in the scope of this item? Having some of the features in the scope helps this item.

Ericsson: regarding EDT we didn’t have requirements. But for PSM mode, what is that the UE is not required to perform search? There is no requirement in the RRM spec for PSM mode.

Nokia: there is no cell in that mode so we need to change to cover this case. Just a clarification.

MediaTek: we need to finalize the core part before Dec. 2022. We agree with Nokia on the continuous coverage issue. In general discussion on LEO is important I encourage companies to bring input in the next meeting.

## 13 Liaison and output to other groups

### 13.4 Moderator summary and conclusions

**[104-e][240] LS\_reply, AI 13.1.1, 13.1.3 and 13.2.1 – Yuexia Song**

**R4-2214160 Email Discussion Summary for [104-e][240] LS\_reply**

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

**Abstract:**

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

**Decision: Revised to R4-2214289**

**R4-2214289 Email Discussion Summary for [104-e][240] LS\_reply**

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

**Abstract:**

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

**Decision: Noted**

**Conclusions after 1st round**

Please refer to the latest tdoc list at <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_104-e/Inbox/Tdoclist>

**Conclusions after 2nd round**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2214351 | WF on Figure Group 6-1a | Apple | Agreeable |
| R4-2214352 | WF on RTD for MIMO with two TAs | Huawei | Agreeable |
| R4-2214353 | WF on UL Segmented Transmission for UL synchronization for IoT NTN | MediaTek | Agreeable |
| R4-2214354 | LS on LS on maximum uplink timing difference for Multi-DCI Multi-TRP with two TAs | Ericsson | Agreeable |
| R4-2214355 | LS on Feature Group 6-1a “bwp-WithoutRestriction” | Qualcomm | Agreeable |

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**GTW on Aug-23**

**Topic #2: Feature Group 6-1a (R2-2204009, RP-221870)**

**Issue 2-2: how should the UE perform BM/RLM/BFD when the active BWP does not contain SSB?**

* Proposals
  + Option 1:

Perform BM/RLM/BFD based on CSI-RS are mandatory features, and should be the baseline assumption for supporting *bwp-WithoutRestriction*.

* + Option 1a (New):

Perform BM/RLM/BFD based on CSI-RS are mandatory features, and should be the baseline assumption for supporting *bwp-WithoutRestriction*.

* + - For FR2: the CSI-RS repetition is on (FFS).
  + Option 2:

UE should 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.

* + Option 3:

It is feasible to perform BM/RLM/BFD on RSs that are not contained within the active BWP based on following:

* + - UE’s capability to operate using larger BW,
    - Whether UE is equipped with a separate RF chain
  + Option 4:

To support the concerning scenario, existing RAN4 requirements need to be updated by taking into the following potential aspects.

* + - FFS on RF re-tuning before and after the measurement should be allowed for UE to perform L1 measurement on SSB outside BWP.
    - FFS on L1 measurement on SSB outside BWP are performed with shared MG or NCSG for L3 measurement.
    - FFS on Intra-frequency GAP and CSSF for L1 measurement
    - RAN4 shall not rely on CSI-RS for BM/RLM/BFD in FR2 for the BWP operation without SSB.
  + Option 5:

developing the 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 6 (new):

It is feasible to perform BM/RLM/BFD on RSs that are not contained within the active BWP based on following: UE’s capability to operate using larger BW

**Discussions:**

Intel: Using the CSI-RS and NCD SSB are the better approaches which have been discussed for a while. Using SSB is robust and we would like to see it pursued in Rel-18. We also support fixing the problem for the CSI-RS approach in Rel-17.

Vivo: we focus on the feasibility from the UE implementation perspective. Which release is important. We are fine to discuss each of the solutions in Rel-18. The most critical part is what can be done in Rel-17. We support to consider applicability rules to facilitate the approach of UE larger BW. We think it is the only doable one in R17.

MediaTek: which one is feasible for R17 is important. CSI-RS is the first option and the 2nd is enlarging the BW. There is no issue with larger BW approach other than consumption. We think nothing other than CSI-RS approach is feasible for thorough discussion in R17. For CSI-RS everything is ready in FR1 and in FR2 reperition is on already. So even back from R15, this can be supported from the UE perspective.

Apple: the most critical thing here is the timeline. We also think the CSI-RS approach is the most compromised solution in R17. We can further discuss others in the later realeses. Larger BW approach needs interruption requirements. Same for others requirements are needed. Other implementation is impacted. It is very difficult to choose any single one other than the CSI-RS approach.

Ericsson: we have similar comments on the timeline. We need to be realistic. Option 3 is the most positive one in this respective. Operating in a larger bandwidth seems no problem and we are also ok to option 6. For others we prefer to discuss them in the R18. For CSI\_RS approach whether it can be used as an independent resource for RLM/BFD is questionable.

CMCC: For option 3/6 some UE does not implement like that. We need spec work otherwise the problem still exists. UE supporting CSI\_RS is the baseline. Regarding option 6, 6-1a is the capability why do we need another?

Huawei: we confirm that option 1 is already in the spec since R15. It is working. For us it is the only feasible one in R17. We are open to discuss others but they need further discussion and spec work. Among the options, we support option 5 NCD-SSB as our 2nd choice. Further discussion happens in the later releases.

OPPO: we think it is feasible for UE to perform RLM/BFD on the CSI-RS within the active BWP. If CSI-RS is not within BWP, there is no requirement. Consider the limited time in R17, we prefer to go with the simplest way. We are open to discuss other options in later release.

Qualcomm: option 1 is not the only solution in RAN4. We also need SSB based solution. And we also think option 3 is good. We may not different whether it is vacant chain or using larger BW. Bwp-withoutrestriction is an important feature for load balance.

CATT: we prefer option 1. We share view with CMCC and Huawei. We don’t need another capability other than bwp-restriction. Option 1 is the only one in R17.

Spreadtrum: I have concern on CSI-RS approach in R17. In TDD system, the network replies on SRS for CE. CSI-RS is not always available. Larger BW approach seems better. If the distance between SSB and the active BW is large it is not efficient for power. In R18, we think NCD-SBB is the best approach.

ZTE: according to legacy spec, the UE can only perform RLM/BFD within the active BWP. Whether the UE is able to measure outside active BWP depends on UE implementation. This issue is similar to L3 measurements. So we are open to discuss option 3,4 and 6 in R18.

Nokia: in this difficult case for UE, either the UE needs to indicate the capability of withoutrestriction or to measure on the CD-SSB. Using gap to do L1 is also possible.

MediaTek: to reply to concerns to option 1. Dependent CSI-RS is not always the case maybe only for RedCap. For FR2 the repetition is on. The network is fully aware of all the RS for both DL and UL. We don’t consider bad configurations from the network in our work. Regarding option 3, we are not sure which one in UE implementation is better for it. It requires debate before we can converge on the implementation.

Qualcomm: minimum effort is considered in R17. RAN4 didn’t consider all the capability introduced in RAN1/2 in R15. The concerned one was overlooked then. The simplest ways are option 2 and 3.

Ericsson: to clarify on option 1, is it applied only when the CSI-RS is provided in the active BWP. If so we need to clarify it together with option 1. To proponent of option 3, do you intend to specify new requirement or the existing spec is sufficient? Does the UE switch RF or make it on all the time? It is for both larger BW and vacant chain approaches.

Apple: we have the same answers with MTK. To Ericsson: the CSI-RS has to be in the active BWP. We are not choosing any single one among the options since we need to be fair to all the possible implementations. Further discussions fair to all the options should be done in R18.

CMCC: to Ericsson: CSI-RS is configured within active BWP. If there is no interruption/retuning from option3, we are OK. But it seems not the case so we need more discussion upon it. For NCD-SSB do we expect it to be always available? It is the same with CSI-RS if not worse.

Vivo: is it possible for the UE to support 6-1a in Rel-16? CSI-RS cannot be used as a standalone source for RLM/BFD. NCD-SSB is a good approach to be discussed in Rel-18.

Huawei: a comment on option 3 we are not sure it is appropriate way to go the simple way. We need to pursue the efficient way. All needs to be evaluated to reach a tradeoff among factors. If there is interruption the UE is not allowed to indicate the withoutrestriction capability.

Qualcomm: we cannot rely on CSI-RS approach. So other approaches are needed. The issue now is we want to avoid to push everything to R18. Optnio 3 work seems corrections to us.

Nokia: for option2 how does network cope with different implementations. For option 3 we prefer no interruption.

Intel: for Rel-18 NCDSSB is the best one. Option3 largerBW approach is the most robust one in R17. Other options require much spec work.

**Tentative Agreement:**

How does the UE perform BM/RLM/BFD when the active BWP does not contain SSB?

RAN4 has examined the spec in Rel-15, Rel-16 and Rel-17 and listed the in the following possible solutions for the issue:

Perform BM/RLM/BFD based on CSI-RS within active BWP

* + - RAN4 has requirements to support BM/RLM/BFD based on CSI-RS within active BWP and no spec change is needed

Other than the CSI-RS based solution, in order to support the concerning scenario, existing RAN4 requirements can be updated by taking into consideration of the following potential independent features

* + UE’s capability to operate using larger BW, or UE is equipped with a separate RF chain
    - ~~FFS on the interruption caused or scheduling restriction requirements~~
  + BM/RLM/BFD on SSB outside BWP are performed with shared MG or NCSG for L3 measurement.
    - ~~FFS on Intra-frequency GAP and CSSF for L1 measurement~~
  + Develop the NCD-SSB approach which would work with existing UE hardware architectures (FG6-1) and be compatible with existing RAN4 specifications for BM/RLM/BFD
    - ~~FFS on extending NCD-SSB feature to non-redcap UE~~
  + Note: RAN4 obeservation is that the above listed independent features do not have proper placeholder as part of RAN4 work in Rel-17 since RAN4 requirements may need to be developed to support the features

**Issue 2-3: in which release and how to introduce enhanced RRM requirements to support Feature Group 6-1a “bwp-WithoutRestriction”?**

* Proposals
  + Option 1:

Continue discussion in Rel-17 under TEI17

* + Option 2:

In Rel-18 under the umbrella WI “ Rel-18 RRM enhancement”

* + - The support of Feature Group 6-1a “*bwp-WithoutRestriction*” in Rel-17 is left to implementation.
  + Option 3:

Feature Group 6-1a “*bwp-WithoutRestriction*” with mandatory supporting FG 1-7 and /or 2-31, and the corresponding requirements can already be supported from Rel-15.

* + Option 3a (new):

Feature Group 6-1a “bwp-WithoutRestriction” with mandatory supporting FG 1-7 and /or 2-31 and/or FG-24, and the corresponding requirements can already be supported from Rel-15.

* + - For FR2: the CSI-RS repetition is on (FFS).
  + Option 4 (new):

Leave it to RAN decision.

**Discussions:**

**Agreement:**

**Topic #1: Time differentiate for MIMO with two TAs (R1-2205593)**

**Issue 1-1: Align views on whether MRTD/MTTD requirements in 38.133 cover intra-cell case (2CCs)**

*NOTE: the following terminology is used in Option 1/2/3.*

* + - *MRTD/MTTD for CA, DC*
    - *MRTD/MTTD for intra-cell MIMO (single CC and different TRP having same physical cell ID)*
    - *MRTD/MTTD for inter-cell MIMO (single CC and different TRP having different cell ID).*
* Proposals
  + Option 1 (modified): The current MRTD/MTTD requirements in RAN4 only defines the time difference limitation for different CC case, e.g. CA and DC, but not MIMO.
  + Option 1a: The current MRTD/MTTD requirements in RAN4 only defines the time difference limitation for different CC case (i.e., CA or DC). However, the requirements shall also be applicable to the case in which “UE is configured to receive multiple PDSCH transmission occasions from one or more QCL sources on any one of the aggregated NR carriers.”
  + Option 2: The current MRTD/MTTD requirement in RAN4 cover CA, DC and intra-cell and inter-cell MIMO.

**Discussions:**

**Agreement:**

**GTW on Aug-25**

**WF on Feature Group 6-1a**

**Issue 2: how should the UE perform BM/RLM/BFD when the active BWP does not contain SSB** **associated to the initial DL BWP**

**Agreement:**

RAN4 has examined the Rel-15, Rel-16 and Rel-17 specs. The following possible solutions for the issue are identified.

* Perform BM/RLM/BFD based on CSI-RS within active BWP
  + RAN4 has requirements to support BM/RLM/BFD based on CSI-RS within active BWP and no spec change is needed
* Following potential independent implementations/features requires either existing RAN4 requirements to be updated or new requirements to be developed.
  + 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
  + Note: RAN4 does not reach consensus on whether to work on the above items in Rel-17 including to update the existing RAN4 requirements or to develop new requirements
  + ~~Note: RAN4 has no TU to work on the above items in Rel-17 including to update the existing RAN4 requirements or to develop new requirements~~
  + ~~[For UE using larger BW or separate RF chain without interruption or scheduling restriction, existing requirements can be applied with applicability definition. Power consumption of such implementation can be higher and whether the power saving gain from the BWP operations maybe compromised are not investigated thouroughly.]~~
  + ~~Note: RAN4 observation is that the above listed independent implementations/features do not have proper placeholder as part of RAN4 work in Rel-17 since RAN4 requirements may need to be developed to support the features~~

**Discussions:**

Qualcomm: about NCD-SSB, there is no definition for NCD-SSB. RAN1 made the agreement that NCD-SSB is not considered.

Vivo: firstly, this WF is just trying to formulating the wording in the LS but it is not something we need to do in the future. We are replying both RAN2 and RANP. Focuses for RAN2 and RANP are different. To RAN2 we need to reply how the UE perform measurements. To RANP, we need to focus on the 6j-1a capability. We have concern on the note observation. For some items it is possible to do in R17.

CMCC: one LS is good enough for both RAN2 and RANP. We are ok with the current wording from the proponent. We want the copy of the WF wording to the LS. RAN4 has not any consensus on any of the item is doable in R17. It is RANP duty to decide.

CATT: we are fine with most of the wordings from WF proponent.

Qualcomm: the amount of spec work needed for UE using larger BW or separate RF chain is the least among the above bullets. We don’t treat all the bullets the same way.

Apple: different implementations are different in terms of coping with the different bullets above to demand spec work. Over all we need to delivour the thorough information to RANP.

MediaTek: we share the chair’s understanding. We agree with CMCC comments. Regarding the second note, it seems incorrect to judge. We haven’t discussion on this judgement. We disagree to add it.

Huawei: we support the original wording from the WF proponent. We will use the WF wording in the LS. We are concerned about the note 2. There could be different aspects to be considered to evaluate which one is the best one. We suggest to not go priorizing anything.

Vivo: regarding the number of LS, we are fine to send a single LS. We should put RANP in the TO list of the LS. Same comments to QC on the procedure. It is hard to say who’s comment is captured. Proponent is doing a good job. We can remove the FFS parts. We are not further studying any of the FFS parts. In Rel-18 we need a WI to do that if we agreed on the FFS parts. Fair observation is that’there is no consensus on whether to do any of the items in Rel-17’ .

Qualcomm: feasibility is not about everybody doing it. It is feasible if there is at least one who can do it. We support the Note to differentiate the work load.

Apple: let’s have some polishment on the wording.

Ericsson:

CMCC: suggest the wording: ‘For UE using larger BW or separate RF chain without interruption or scheduling restriction, existing requirements can be applied with applicability definition’

Qualcomm: we agree with the CMCC wording.

Apple: on the CMCC wording, RAN4 has not spent time investigating the details in the context. We had not the formal work so it seems not mature at the moment to conclude this way. We should spend more time to investigate the details. For any new proposlas, we will not preclude any nor apply different requirements to different UE implementation. To me this proposal implicates differentiation.

Huawei: we don’t agree to focus only on spec aspects in evaluation. Either we remove the note or go with our wording.

MediaTek: we agree with Huawei on their new wording. Larger BW means UE covering SSB outside active BWP. We need to clarify what larger BW means.

Qualcomm: there is nothing for us to investigate for the approach. We don’t agree with the Huawei note since it is not technically correct. The UE has more chance to get scheduling.

Apple: we cannot agree on the last note. we have concern on treating a approach differently than others.

Vivo: it is difficult discussion. We are fine with the note. since we may also touch what is possible in R17. If CSI-RS based solution is feasible in R17, from standards perspective why companies have strong concern on enabling another possible UE implementations in R17?

Huawei: we have similar view as Apple. We don’t see there is a strong need to support any other particular solution in R17. Qualcomm comments on the power is based on assumption of certain network algorithm.

MediaTek: we actually had nothing discussed about investigations on different items. We don’t agree to any judgment at the moment.

Qualcomm: CSI-RS feature is with capability signalling. For some network it is not enabled.

**Agreement:**

## 14 Revision of the Work Plan

## 15 Any other business

## 16 Close of the E-meeting

Report prepared by: MCC

3:2020 for the upper frequency range of the RI test, Rel-17

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

**Abstract:**

Based on the updated content of the IEC 61000-4-3:2020 specification, the related 6GHz upper frequency limit for the Radiated Immunity testing is removed with the consideration of possible test lab capability limitation beyond 6GHz.

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